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Report on mineral exploration activities in Québec 2002

Québec

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DISCLAIMER

The data compiled in this report come from a number of sources, including questionnaires addressed to prospectors, to directors of regional exploration funds, and to representatives of mining and exploration companies, as well as from their press releases. The accuracy and reliability of this information depend solely on these sources. The authors disclaim all responsibility for reproducing any errors originating from these sources but are nonetheless responsible for mistakes introduced while writing the report, this despite rigourous editing of the document by an external editor and final review of the contents by Ministry personnel.

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Highlights

This annual report provides an overview of mining exploration activities in Québec in 2002, and outlines the mineral potential of Québec's geological provinces. Given the number of significant discoveries in the field of diamond exploration that occurred during the year, the positive impact of rising gold prices, and the consistently favourable perception of mining exploration companies regarding Québec's mineral potential, the number of exploration projects remained stable relative to last year. A significant increase in total expenditures in diamond exploration in the Near North was also noted. Once again this year, according to a survey conducted by the Fraser Institute, Québec ranks second among the best jurisdictions in the world for mining investment.

One of the highlights in mineral exploration in Québec in 2002 was undoubtedly the announcement in November by **Canadian Royalties Inc**. of spectacular results from its work on the Mesamax zone, located along the extension of the Expo-Ungava property in the Cape Smith belt. The company reported high grades in Ni, Cu, Co, PGE, and Au in several drillholes, including drillhole MXNW-02-28, from which a 6.04-m section graded 2.33% Ni, 4.32% Cu, 0.10% Co, 0.1 g/t Au, 1.26 g/t Pt, and 63.37 g/t Pd. This announcement sparked a staking rush in this part of Québec's Far North region. Diamond exploration in Québec also generated interest following the discovery in December 2001 of two kimberlite pipes, Renard 1 and 2, on the Foxtrot property, located 80 km north of the Otish Mountains, by **Ashton Mining of Canada** and **SOQUEM INC**. In June 2002, the two companies reported the recovery of 1.69 carats of diamonds in a 2.4-tonne sample extracted from the Renard 2 pipe, for a grade of 0.69 carat per tonne (69.3 ct/100 t). In December, the partners announced that a 4.88-tonne sample collected from Renard 3 had yielded a total of 6.54 carats of diamonds larger than 0.85 mm (134 ct/100 t). To date, eight diamond-bearing kimberlitic bodies, Renard 1 to Renard 8, have been discovered on the Foxtrot property. Elsewhere in the Otish Mountains area, **Pure Gold Minerals** and **Ditem Explorations** confirmed the discovery of two new kimberlite pipes, H-1 and H-2, on the Tichegami River property, south of the Otish Mountains. Pipe H-2 is diamondiferous. Several companies also announced the presence of kimberlite indicator minerals in this area, namely **Majescor Resources-Canabrava Diamond Corporation**, **Plexmar Resources**, **Strateco Resources**, **Dios Exploration**, and **Majescor Resources-BHP Billiton Diamonds Inc**. In the Wemindji area, **Majescor Resources** announced the recovery of two microdiamonds from an 8.5-tonne sample collected in a subhorizontal kimberlite sill. In the same area, **Dianor Resources** identified over 400 lamprophyre dikes and 10 heterolithic breccia bodies on their properties. Three microdiamonds were recovered from three lamprophyre dikes. **TGW Corporation** also reported the discovery of kimberlite indicator minerals west of Matagami. Finally, in the Torngat Mountains area east of Ungava Bay, **Diamond Discoveries** identified four kimberlite pipes in 2002, which are in addition to a number of previously known diamond-bearing dikes.

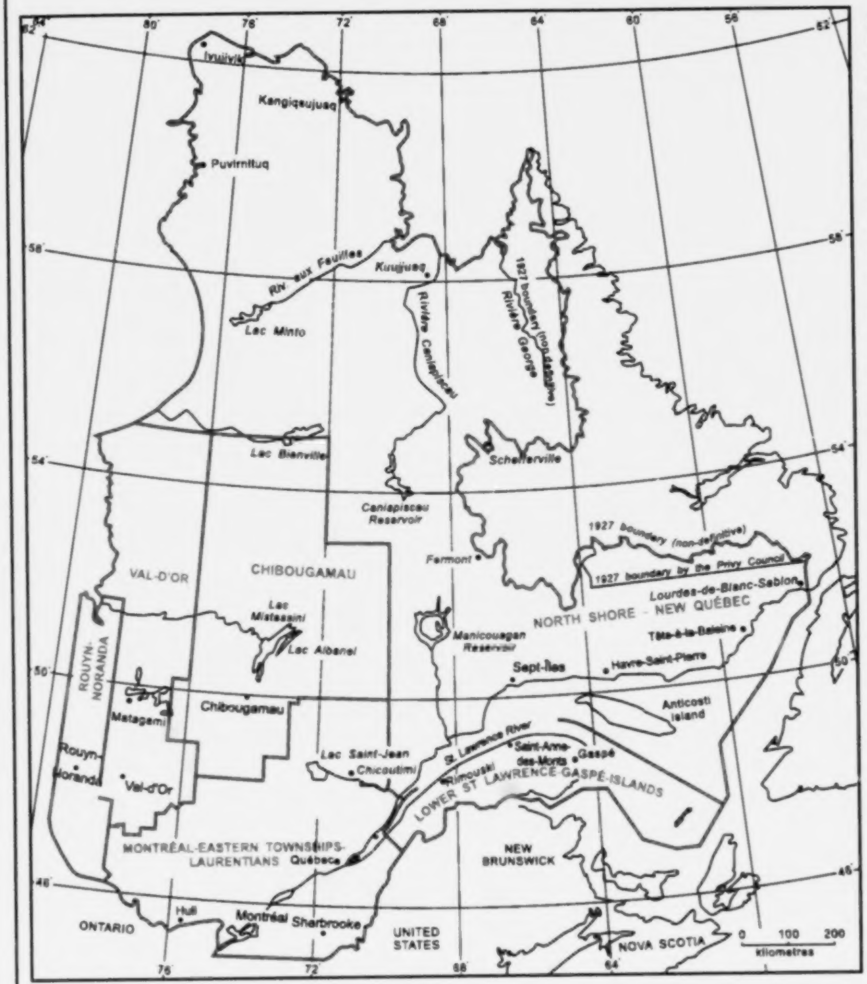
In the Near North region, several gold projects yielded significant results. **Matamec Explorations** reported numerous gold-bearing drill intersections from zones 25 and 26, on the "La Pointe" project, Sakami property. **Cambior** and **Virginia Gold Mines** investigated the extensions of zones 32 and 30 on the La Grande Sud property. Drillhole LGS02-198 yielded grades of 4.4 g/t Au over 7.40 m. On the Poste Lemoyne property, held jointly by **Virginia Gold Mines** and **TGW Corporation,** drillhole PL02-31 intersected 13.0 m at an uncut grade of 14.13 g/t Au. **Sirios Resources** and **SOQUEM INC.** reported drill intersections of 35.99 g/t Au over 2.0 m, 77.81 g/t Au over 1.0 m, and 13.15 g/t Au over 2.0 m from the Lingo-West vein on the Aquilon property. On the Noella property in the Caniapiscau sector, **Virginia Gold Mines** discovered the Bear showing, where grades of 5.4 g/t Au over 4.9 m, 10.84 g/t Au over 4.0 m, and 6.56 g/t Au over 4.0 m were obtained.

The 2002-2003 campaign marked the fifth year of Géologie Québec's *Far North Project*, whose goal is to complete a geological reconnaissance at 1/250,000 scale of Québec's landmass north of the 55th parallel. New geological maps were produced for the Lac-à-l'Eau-Claire and Puvirnituq areas (NTS sheets 33O, 34B, 34C and 35C).

The Abitibi-Témiscamingue region was the focus of large-scale exploration programs. Furthermore, major development work was undertaken and production resumed in certain mines. **Aurizon Mines** conducted a $2-million exploration program to test the extensions of zones 113, 118, and 120 at the former Casa Berardi mine, located 130 km west of Matagami. Two exploration campaigns along the Destor-Porcupine fault yielded significant results. **Cambior** and **Cogema Resources** drilled 10 holes on the Nemrod East zone. Drillhole POR02-118 intersected 1.45 m at 9.6 g/t Au. **Globex Mining Enterprises** and **Kinross Gold** completed 14 drillholes on the Duquesne West property. Drillhole DQ-02-02, testing the extension of the Shaft zone, intersected 11.15 m grading 6.86 g/t Au. On the Francoeur and Norex properties, **Richmont Mines** completed a $1.3-million exploration program to confirm the continuity of the North Zone. **Agnico-Eagle Mines** also reported that its deep drilling program at the LaRonde mine had encountered economic mineralization along the western limit of Zone 20 North. **Strateco Resources** and **Géonova Explorations**, a subsidiary of **Campbell Resources,** reported a drill intersection from the Discovery project, located north of Lebel-sur-Quévillon, grading 12.84 g/t Au over 8.85 m. In the Val-d'Or mining camp, development work continues at the Sigma-Lamaque complex held by **McWatters Mining**. Commercial production is slated to begin in early 2003. Drillholes in the hanging wall at the Kiena mine, shut down in late September, delineated a new resource of 1,178,700 tonnes of ore at a grade of 4.25 g/t Au. A positive feasibility study was completed on the East-Amphi project, also held by **McWatters Mining** and located west of Malartic. This project contains reserves estimated at 1,368,747 tonnes at a grade of 4.16 g/t Au. Production gradually resumed in January 2002 at the Beaufor mine, held by **Richmont Mines** and **Louvem Mines**, following reconditioning completed in the fall of 2001. In the Chibougamau mining camp, production resumed during the second quarter at the Joe Mann mine operated by **Campbell Resources**. Resources are estimated at 1.7 Mt at a grade of 11.18 g/t Au and 0.28% Cu.

In the North Shore region, **Ressources Appalaches** and **Marum Resources** reported results from two drillholes on the Inco grid on the B20 property, located about 20 km west of Port-Cartier. These drillholes intersected mineralized horizons, including sections with up to 1.2% Ni, 1.6% Cu, 0.13% Co, and 0.4 g/t Pt. Northeast of Natashquan, **Ressources Appalaches** reported the discovery of palladium showings (up to 1.6 g/t Pd and 1.5% Cu).

McKenzie Bay International Ltd released, in April 2002, the results of a feasibility study recommending the development of a vanadium mine at the Lac Doré deposit, located southeast of Chibougamau, and the construction of a vanadium processing plant. Finally, prospecting activities for industrial minerals remained stable in southern Québec, mainly due to the efforts of the various regional exploration funds.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Ivujivik
Kangiqsujuaq
Puvirnituq
Riv. aux Feuilles
Kuujjuaq
Lac Minto
Rivière Caniapiscau
Rivière George
1927 boundary (non-definitive)
Lac Bienville
Schefferville
Caniapiscau Reservoir
Fermont
1927 boundary by the Privy Council
Lourdes-de-Blanc-Sablon
VAL-D'OR
CHIBOUGAMAU
Lac Mistassini
Lac Albanel
NORTH SHORE - NEW QUÉBEC
Manicouagan Reservoir
Tête-à-la-Baleine
Sept-Îles
Havre-Saint-Pierre
ROUYN-NORANDA
Chibougamau
Matagami
Anticosti Island
Rouyn-Noranda
Val-d'Or
Lac Saint-Jean
Chicoutimi
St. Lawrence River
Rimouski
Saint-Anne-des-Monts
Gaspé
LOWER ST LAWRENCE-GASPÉ-ISLANDS
MONTRÉAL-EASTERN TOWNSHIPS-LAURENTIANS
Québec
NEW BRUNSWICK
ONTARIO
Hull
Montréal
Sherbrooke
UNITED STATES
NOVA SCOTIA
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kilometres

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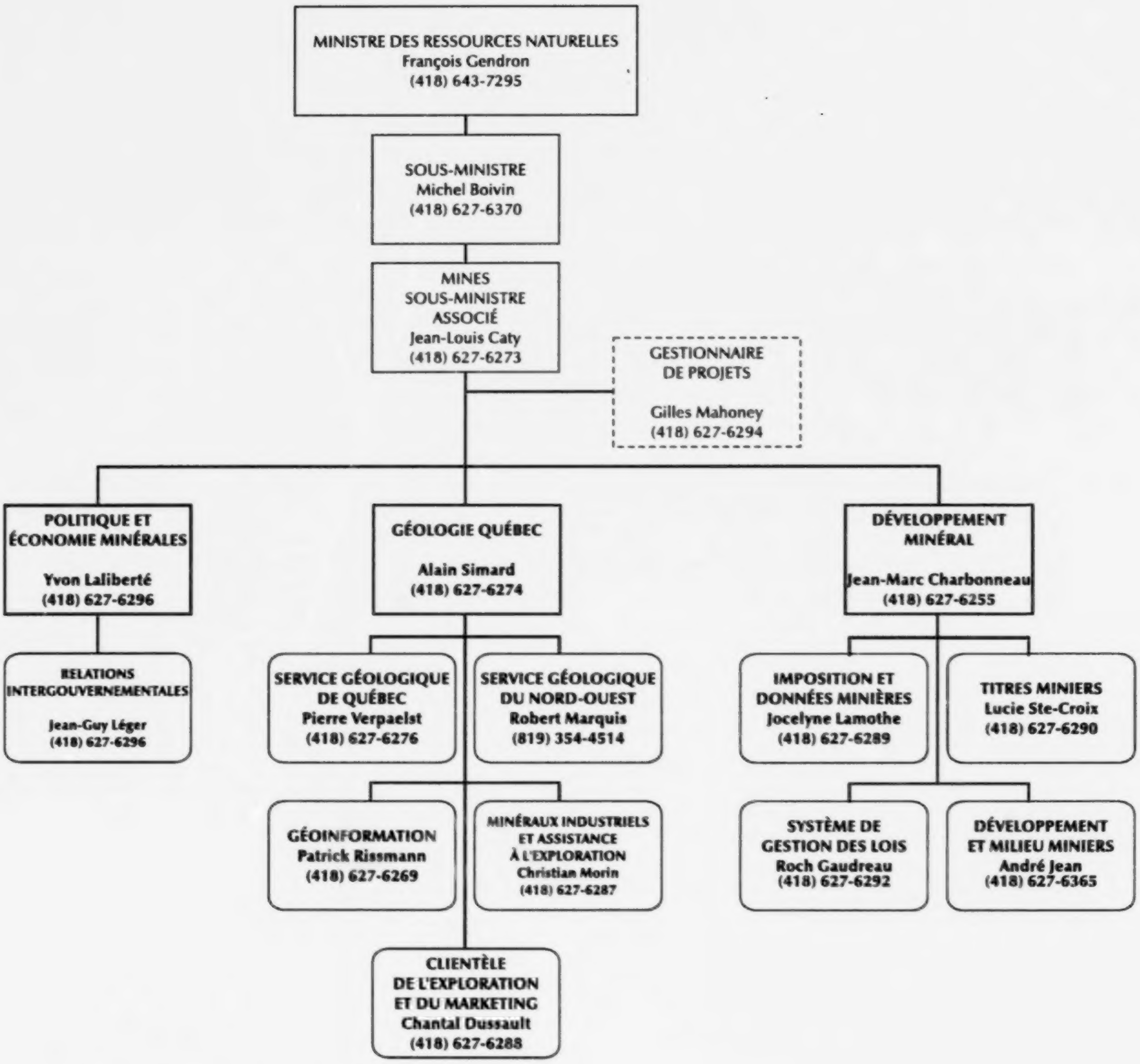
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february 2003

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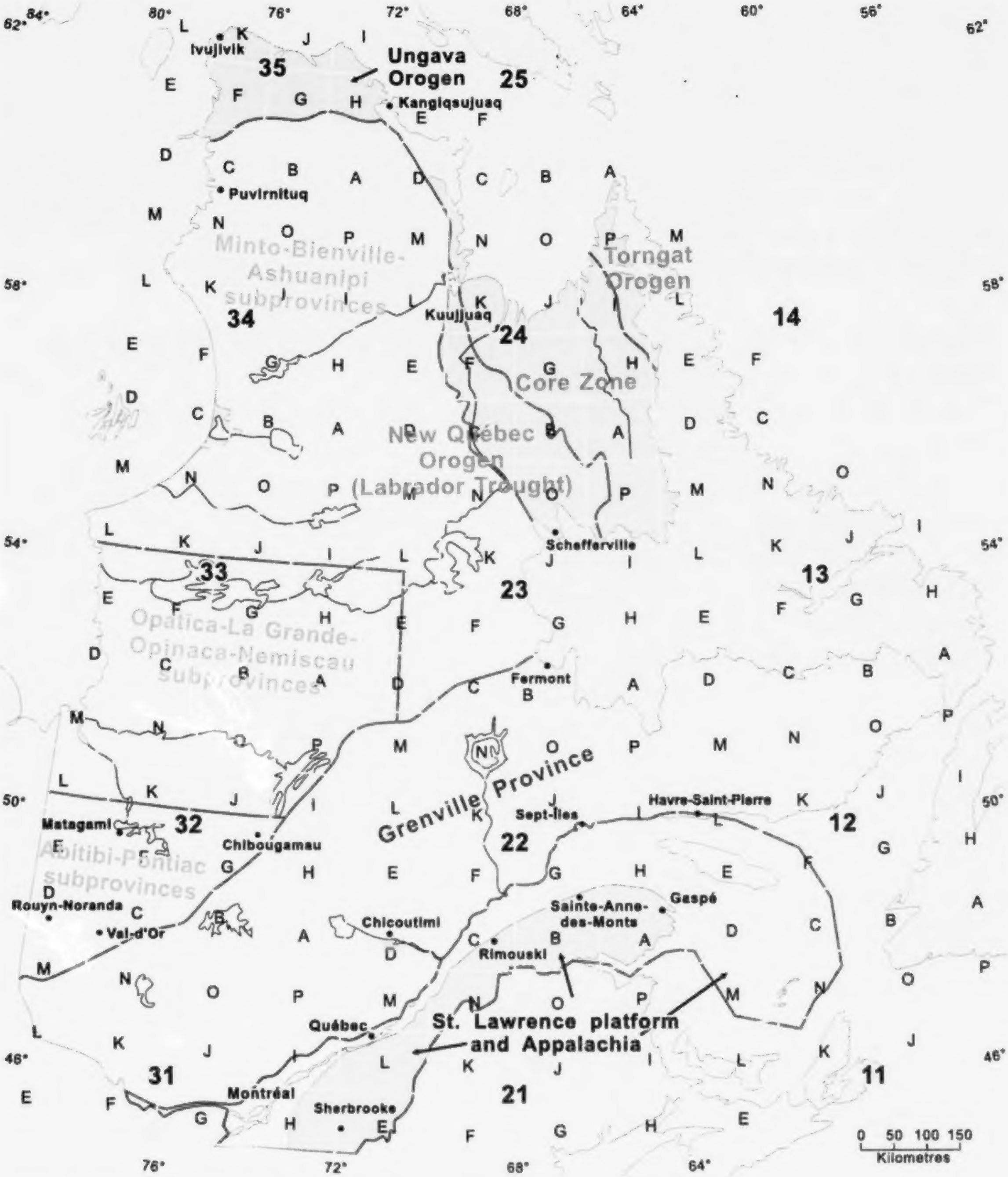

Ungava Orogen
35
25
Ivujivik
Kangiqsujuaq
Puvirnituq
Minto-Bienville-Ashuanipi subprovinces
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Kuujjuaq
24
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22
Abitibi-Pontiac subprovinces
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Val-d'Or
Chicoutimi
Sainte-Anne-des-Monts
Gaspé
Rimouski
St. Lawrence platform and Appalachia
Québec
31
Montréal
Sherbrooke
21
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84°
80°
76°
72°
68°
64°
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56°
62°
58°
54°
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Kilometres

Figure 1. Geological and territorial subdivisions used in this report.

Chapter 1
Base and precious metals

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Northern Part of the Superior Province (Minto, Bienville, and Ashuanipi Subprovinces)

Serge Perreault
James Moorhead

The Ungava Peninsula forms a vast landmass covering about 350,000 km^2. Although this area has been the focus of little exploration, it nevertheless offers a promising mineral potential. This chapter deals with the northern part of the Superior Province, which includes the Minto, Bienville, and Ashuanipi subprovinces.

In 1997, the Far North region, which comprises the subprovinces discussed in this chapter, was the focus of an extensive lake sediment geochemical survey. This survey was conducted by **Géologie Québec** and its partners from the exploration industry, namely **Falconbridge Ltd.**, **Noranda Mining and Exploration**, **SOQUEM Inc.**, **Cambior**, and **Virginia Gold Mines**. Nearly 24,000 lake sediment samples were collected, averaging one sample per 13 km^2 over a total surface area of 350,000 km^2 in Québec's Far North region. In 1998, **Géologie Québec** launched the Far North mapping program at 1:250,000 scale, which represents the most ambitious regional geological mapping program ever undertaken in North America. In our study area, 18 geological surveys have been completed since 1998. In 2002, three surveys were conducted, in the Povungnituk area (NTS sheets 35C, 35F/01, and 35F/02) by Berclaz *et al.* (2002), in the Lac Montrochand area (NTS sheet 33O) by Roy *et al.* (2002), and in the Lac à l'Eau Claire area (NTS sheet 34B) by Parent *et al.* (2002a).

In 2002, several university-based, post-graduate research projects were carried out by Géologie Québec in conjunction with its geological surveys. These included a study, launched in 2001, of the tectono-stratigraphic and metamorphic evolution of the Qalluviartuuq-Payne volcano-sedimentary belt (Leclerc *et al.*, 2002), a study of the 3.82 Ga Porpoise Cove supracrustal sequence in the Inukjuak area (David *et al.*, 2002), and a study of the enderbitic suites of the NE Superior Province (Vallières *et al.*, 2002). Surveys and studies of Quaternary geology and diamond potential conducted in partnership with the Geological Survey of Canada included a diamond potential assessment based on esker sediments in the Lac Bienville area (33P) and tills in the Lac Anuc area (34O) (Beaumier *et al.*, 2002), a polyphase glacial dynamics study and a reconnaissance survey of kimberlite indicator minerals in eskers along the western Saindon-Cambrien corridor (Parent *et al.*, 2002b), and a study involving a reconstruction of the glacial landscape of a segment of the Koroc River, in northeastern Ungava (Paradis *et al.*, 2002). A highlight of the year was the discovery of volcanic rocks older than 3.82 Ga in the Inukjuak area, making this supracrustal belt one of the oldest on Earth, along with the Isua belt in Greenland (David *et al.*, 2002).

Sixteen exploration projects were carried out in the area in 2002. These projects required expenditures of about $1.7 million, compared to $2.9 million invested in 2001. This substantial drop in expenditures is attributed to the number of projects that were abandoned in 2001. For each commodity or group of commodities, the breakdown of exploration expenses for the year 2002 is as follows: 80 % for Ni-Cu-Co-PGE, 17 % for diamonds, and 3 % for precious metals (Au-Ag) and base metals (Cu-Zn-Pb). Six projects submitted by prospectors were funded under the Québec Mineral Exploration Assistance Program (MEAP - components A1 and A2) allocated to the Nunavik Mineral Exploration Fund.

The following sections detail the most significant exploration projects carried out in 2002 in the Bienville, Ashuanipi, and Minto subprovinces. Where possible, projects are grouped according to the volcano-sedimentary belt in which they were conducted.

Bienville Subprovince

The Bienville Subprovince is a plutonic assemblage that occupies the southern part of the northern Superior Province. The Bienville is composed mainly of migmatized orthogneisses ranging from tonalitic to granodioritic in composition, with enclaves of supracrustal (iron formation, paragneiss, metavolcanic rock) and plutonic (ultramafic) rocks. These rocks are intruded by synkinematic granodioritic to tonalitic plutons, and by late biotite granites (Hocq, 1994). This subprovince also contains volcano-sedimentary belts, such as the Lac Fagnant belt, metamorphosed to the amphibolite facies.

Ashuanipi Subprovince

The Ashuanipi Subprovince comprises a gneissic-plutonic assemblage in northeastern Superior Province (Card and Ciesielski, 1986). With the exception of a few sectors, such as the Caniapiscau Reservoir area, where metamorphic conditions reached the amphibolite facies, rocks in the Ashuanipi are metamorphosed to the granulite facies. The Ashuanipi is composed mainly of paragneisses (metatexites and diatexites) and mafic and felsic orthogneisses (dioritic and tonalitic) with orthopyroxene-garnet-biotite assemblages, which are intruded by synkinematic pyroxene tonalite sills or plutons (Percival, 1990). According to Thériault *et al.* (1998), the Ashuanipi shows an intrusive relationship with the La Grande Subprovince. The Ashuanipi-La Grande assemblage was thrust onto the Opinaca Subprovince to the south.

In 2002, prospector **Jean Fortin** (projects 15 and 16, Figure 1A-1) concentrated his efforts in the Courcy Lake area, where the MRN had previously reported the presence of gold showings (Courcy 1 and Courcy 2; Thériault *et al.*, 1998) associated with iron formations and mafic and felsic volcanic rocks of the Courcy and Soulard formations. Prospectors **A. Lefebvre**, **N. Noël**, and **N. Goulet** (project 14, Figure 1A-1) explored the Archean Courcy Formation in search of Cu-Pb-Zn-Au-Ag mineralizations. Their efforts were focused on the regional Lac Vallard fault, which separates mafic and felsic volcanic units from sedimentary units of the Courcy Formation.

Minto Subprovince

The Minto Subprovince occupies the northernmost part of the Superior Province in Québec. It is composed of granulite-grade or upper amphibolite-grade plutonic and gneissic rocks (Card and Ciesielski, 1986). It is subdivided into eight domains or terrains, based on lithological, structural, and aeromagnetic criteria (Percival *et al.*, 1995, 1997). These terrains are characterized by specific lithological associations, and are not necessarily bounded by ductile faults. From east to west, we find: the Douglas Harbour Terrain (plutonic and volcano-sedimentary rocks), the Lepelle igneous Complex (pyroxene granodiorite), the Utsalik Terrain (granodiorite, granite, pyroxenite, gabbro, diorite, and volcano-sedimentary rocks), the Goudalie Terrain (tonalitic gneisses and the Vizien greenstone belt), the Qalluviartuuq Terrain (volcano-plutonic and volcano-sedimentary rocks), the Philpot Terrain (orthogneiss), the Lac Minto Terrain (granodiorite, granite, and volcano-sedimentary rocks), the Tikkerutuk Terrain (plutonic rocks), and the Inukjuak Terrain (granite with metasedimentary enclaves).

The Minto is an amalgamation of geological assemblages composed of tonalitic rocks invaded by voluminous granitoid intrusions. Granitic and charnockitic complexes are associated with vast positive aeromagnetic anomalies (40 to 100 kilometres wide), whereas volcano-sedimentary belts are confined to narrow troughs (10 to 20 kilometres), commonly enclosed in gneissic tonalite suites (Leclair *et al.*, 2002). These volcano-sedimentary belts generally consist of paragneisses and mafic metavolcanic rocks. Banded iron formations, intrusive and extrusive ultramafic rocks, felsic volcanic rocks, and rare carbonate horizons also occur.

Mapping conducted by **Géologie Québec** since 1998 has outlined about forty, previously unknown, volcano-sedimentary belts. These belts exhibit geological settings comparable to those present in the Kogaluk, Payne, Qalluviartuuq, and Duquet belts, where the mineral potential is fairly well established.

VENUS BELT

Located about 100 km north of the Trans-Taïga road and the Fontanges airport, the Venus belt (NTS sheet 23M/11) extends for nearly 30 km in length. The southeastern part of the belt exceeds 10 km in width. The belt is composed mainly of basalts, gabbros, komatiitic lavas, ultramafic intrusive rocks, felsic to intermediate tuffs, and oxide- and silicate-facies iron formations. The basal part of the Venus belt contains a highly magnesian ultramafic volcanic sequence up to 4 km thick and 15 km long, which contains intercalated sulphide-rich sediments and mafic and felsic volcanic rocks. These ultramafic rocks consist mainly of massive komatiitic flows with olivine cumulates and spinifex textures, intercalated with sulphide-rich sediments. As a result of mapping conducted in 1998 in the Gayot Lake area, Géologie Québec reported the presence of Ni-Cu mineralization, originally known as the Loup showing (2 % Ni, 1 % Cu, and 0.65 g/t Pd), in the Venus belt southwest of Gayot Lake (Gosselin and Simard, 2000).

In 2000, **Virginia Gold Mines** concluded an agreement with **BHP-Billiton**, granting the latter the option to acquire a 50 % interest in the Gayot Lake property by spending a total of $4.5 million in exploration (project 1, Figure 1A-1). The geological setting of occurrences discovered on the Gayot Lake property is similar in many ways to the Kambalda nickel district in Australia (48 Mt at 3.6 % Ni and 0.25 % Cu).

At the time, surface exploration had outlined four main Ni-Cu-Co-Pt-Pd showings and a few mineralized boulder fields, spread out over a distance of about 10 km. The occurrences include the Gagnon, Gayot, Base Line, Mia, Nancy, Pantoufle, and "L" showings. The Gagnon showing, revealed by about 50 m of stripping, occurs along the contact between an ultramafic flow and a felsic tuff. The ore consists mainly of disseminated and net-textured sulphides with occasional massive sulphide lenses. The sulphides are strongly enriched in nickel, with grades from 7.53 to 9.50 % Ni in the massive facies. The sulphides are also enriched in platinum group elements, with grades reaching 17.17 g/t. The Gayot showing contains massive sulphide lenses that yielded assays of 3.99 to 5.10 % Ni and 1.10 to 1.65 g/t Pt+Pd. The Base Line showing, located 6 km east of the Gagnon showing, graded 1.39 to 1.98 % Ni and 0.42 to 1.20 g/t Pt+Pd. The "L" showing yielded assays of 1.46 to 1.73 % Ni, 0.63 to 0.72 % Cu, and 1.26 to 1.54 g/t Pt-Pd.

In 2002, **Virginia Gold Mines** and **BHP-Billiton** (project 1, Figure 1A-1) continued exploring the area around the Nancy showing, and as a result discovered two new showings, Malorie and Pistolaté, located about 20 km northwest of the Nancy showing. In 2001, Virginia Gold Mines reported grades of 4.35 % Ni, 0.8 % Cu, and 0.79 g/t Pt+Pd over 2.5 m, and 0.84 % Ni, 0.17 % Cu, and 1.02 g/t Pt+Pd over 22 m for the Nancy showing. The company also reported grades of 1.10 % Ni, 0.28 % Cu, and 1.32 g/t Pt+Pd over 19.9 m from trenches on the Nancy East showing. The drill program carried out during the winter of 2002 further enhanced the nickel and platinum group element potential of the Nancy showing. Drillhole GA02-53 intersected two mineralized intervals at the base of the ultramafic flow. The first zone contains disseminated to net-textured sulphides with grades of 1.45 % Ni, 0.33 % Cu, and 1.12 g/t Pt+Pd over 5.1 m. The second interval, grading 9.03 % Ni, 0.6 % Cu, and 9.0 g/t Pt+Pd over 2.55 m, is characterized by massive sulphide lenses from 10 cm to 1 m in thickness. In the same drillhole, a lens of ultramafic rock with disseminated sulphides yielded assays of 1.28 % Ni, 0.26 % Cu, and 1.76 g/t Pt+Pd over 1.5 m. Drillhole GA02-56 was drilled perpendicular to the inferred dip of the ore zone. It intersected, at the base of the flow, a 3-m thick, disseminated sulphide zone grading 0.91 % Ni, 0.19 % Cu, and 1.18 g/t Pt+Pd (**Virginia Gold Mines**, press release dated May 10, 2002, CNW - Canada Newswire). In the Nancy East sector, the joint venture partners drilled two new holes to test the depth extension of the mineralized zone. Drillhole GA02-54 intersected, at the base of the ultramafic flow, a narrow zone of disseminated sulphides, which graded 0.5 % Ni and 0.72 g/t Pt+Pd over 1.4 m. This drillhole also intersected two other sulphide lenses at depth, hosted in the footwall felsic tuffs. The first lens yielded assays of 0.90 % Ni, 0.27 % Cu, and 1.19 g/t Pt+Pd over 2 m, and the second lens, 2.52 % Ni, 0.4 % Cu, and 1.16 g/t Pt+Pd over 2.3 m.

In the vicinity of the "L" showing, drillhole GA02-57 intersected a disseminated sulphide zone in ultramafic rock, along the down-dip extension of the "L" showing, with grades of 1.4 % Ni, 0.74 % Cu, and 1.3 g/t Pt+Pd over 3.5 m (between 188 and 191.5 m). Drillhole GA02-58 tested an airborne and ground EM conductor located near the base of ultramafic flow L North. It intersected several thin ultramafic flows with disseminated, net-textured, and massive sulphides. The best intersections are: 2.4 % Ni, 0.97 % Cu, and 1.75 g/t Pt+Pd over 1.5 m (between 15.7 and 17.2 m), and 1.45 % Ni, 0.88 % Cu, and 1.52 g/t Pt+Pd over 1 m (between 41.2 and 42.2 m).

During the summer of 2002 field campaign, joint venture partners **Virginia Gold Mines** and **BHP-Billiton** discovered two new mineral occurrences about 7 km northeast of the main grid, along the extension of the fertile ultramafic band. Geologists identified two ultramafic sequences. The northern sequence consists of four thin flows, each 10 to 20 m thick, overlain by an ultramafic flow up to 75 m thick. The Pistolaté showing contains two zones of weakly disseminated sulphides located at the base of the two lower flows, whereas the third flow hosts disseminated to net-textured sulphides over a thickness of 0.5 to 3 m near the basal contact. The mineralization is exposed in seven small trenches located along the contact over a distance of 200 m. The best reported grades are: 1.93 to 2.96 % Ni, 0.11 to 2.10 % Cu, 0.06 to 0.1 % Co, and 0.665 to 1.24 g/t Pt+Pd from grab samples collected in the Pistolaté-1 trench. In trench #2, channel sampling yielded grades of 1.84 % Ni, 0.5 % Cu, and 0.5 g/t Pt+Pd over 1.5 m. Grades of 1.55 % Ni, 0.08 % Cu, 0.05 % Co, and 0.32 g/t Pt+Pd were obtained from a 0.7-m channel sample collected in trench #3. The best results were obtained in trench #4, with grades of 2.88 % Ni, 0.11 % Cu, 0.11 % Co, and 0.72 g/t Pt+Pd over 0.5 m. The longest channel sample yielded grades of 0.89 % Ni, 0.37 % Cu, and 0.28 g/t Pt+Pd over 3.1 m, including a 1.5-m interval at 1.41 % Ni, 0.74 % Cu, 0.07 % Co, and 0.49 g/t Pt+Pd.

The Malorie showing, the southernmost occurrence, consists of two small outcrops 60 m apart and contains disseminated to net-textured sulphides and a few cm-scale massive sulphide veins. The best results obtained from grab samples range from 0.71 to 7.46 % Ni, 0.03 to 0.22 % Cu, 0.0 to 0.30 % Co, and 0.24 to 1.82 g/t Pt+Pd. The sulphide content ranges from 5 to 80 % (**Virginia Gold Mines**, press release dated November 7, 2002, CNW - Canada Newswire). According to the company, the mineralized zone at the Malorie showing is open in all directions, and sits at the southwestern end of a 600-m long helicopter-borne EM conductor.

LAC QULLINAARAALUK INTRUSION

In August 2000, the Ministère des Ressources naturelles (MRN) announced the discovery of an interesting nickel-copper showing located 10 km north of Qullinaaraaluk Lake, and about 200 km southeast of Inukjuak (NTS sheet 34G/10, UTM: 518675E, 6393092N). **SOQUEM Inc.** obtained an exploration licence covering the area around the discovery zone. The following month, **SOQUEM Inc.** signed an agreement with **Falconbridge Ltd.** to explore the target area in 2001.

The Lac Qullinaaraaluk massive sulphide showing is located in the east-central part of a mafic to ultramafic intrusion (Labbé *et al.*, 2000). The irregularly shaped intrusion is roughly 750 m long by about 200 m wide. It consists mainly of pyroxenite with a few peridotite horizons. The rocks are massive and fine- to medium-grained, and are not deformed. They intrude a suite of strongly deformed diatexites and metatexites and are themselves cross-cut by late pegmatite dikes and veins. Preliminary mapping of the showing revealed that massive sulphides outcrop sporadically over a lateral distance of about 25 m. The mineralized zone ranges from one to four metres wide. Disseminated to semi-massive sulphides are also observed throughout the intrusion, especially to the northeast of the main zone, where the rock is particularly rusty. Seven surface samples yielded assays ranging from 1.71 to 2.60 % Ni, 0.08 to 1.80 % Cu, and 0.14 to 0.27 % Co.

Previous work by **Falconbridge Ltd.** and **SOQUEM Inc.** includes a helicopter-borne Mag-EM survey and ground EMH surveys, as well as prospecting to determine the Ni-Cu-PGE potential of several mafic intrusions in NTS sheet 34G. In 2002, the two companies (project 3, Figure 1A-1) completed four drillholes totalling 250 m, a hyperspectral survey, and a lake sediment geochemical survey in NTS sheets 34B, C, F, and G.

In 2002, the **Nunavik Mineral Exploration Fund** and individual prospectors continued their search for base and precious metals in three sectors along the coast of Hudson Bay (Table 1A-1). The three target areas are the Inukjuak area (projects 4, 5 and 6, Figure 1A-1), the Umiujaq area (projects 7 and 8, Figure 1A-1), and the Kuujjuarapik area (project 9, Figure 1A-1). Targeted deposit types include magmatic Ni-Cu associated with ultramafic intrusions, diagenetic sedimentary Cu ("redbeds"), Cu-Ag veins, and gold in epithermal veins.

Diamond Exploration

Moorhead *et al.* (2000) outlined the importance of major brittle structural zones, locally defined by late faults, aeromagnetic lineaments, remote-sensing lineaments, and graben-type sedimentary basins, as controlling elements in the emplacement of alkalic and kimberlitic igneous rocks. Several major crustal lineaments transect the Far North region (Labbé, 2000; Labbé and Lamothe, 2001), namely the Saindon-Cambrien corridor, the Lac Allemand-Lac Tasiat structural zone, and the Richmond Gulf structural zone (Moorhead *et al.*, 2000). In fact, Moorhead *et al.* (1999, 2000) targeted the Saindon-Cambrien structural corridor as a prospective zone for the discovery of kimberlitic rocks. Labbé (2000) also outlined several major crustal lineaments in the Far North, based on a structural interpretation and the presence of alkalic intrusions. According to that study, the Aigneau Lake area may potentially host kimberlitic rocks (Labbé, 2000). In the Lac Bienville area (33P), Parent *et al.* (2002b) announced that two picro-ilmenite grains were recovered during a till sediment survey. The location of these two picro-ilmenite grains and a G9 garnet occurrence identified during a till sediment survey conducted by BHP Minerals in 1999 (Girard, 1999; Parent *et al.*, 2002b) form a straight line. Farther north, the boundary between the Lepelle and Douglas Harbour domains is a major lineament along which several alkalic intrusions occur. A petrologic study of the ultramafic phases of these alkalic suites indicates that they are more closely related to lamprophyres than kimberlites (Thériault, 2002).

In 1998, joint venture partners **SOQUEM Inc.** and **Ashton Mining of Canada** acquired a vast exploration property west of the Caniapiscau hydroelectric reservoir, south of Fontanges, in the southwest quadrant of NTS sheet 23L. The remaining claim blocks are known as the Taiga property. **Ashton Mining of Canada** and **SOQUEM Inc**. (project 11, Figure 1A-1) carried out prospecting and a till sediment survey on the Taiga property (23L). Previous work by **BHP** (Girard, 1999) in this area had outlined the presence of indicator minerals, namely picro-ilmenite and magnesian chromite. Since then, five other companies have announced, by way of press releases, the acquisition of exploration properties in this area. No exploration results have been released to date.

In the Gayot Lake area, **Ashton Mining of Canada** and **SOQUEM Inc**. acquired several claim blocks within the scope of their Caniapiscau project. The area had previously been the focus of an extensive till sediment survey (Lucas, 1999; Birkett, 2000). **Majescor Resources** and **Diamondex Resources** (project 2, Figure 1A-1) joined forces to explore this vast area for diamonds. Their 2002 program included a high-resolution airborne magnetic survey and ground follow-up of geophysical anomalies. Previous work conducted by the two companies had identified a regional anomaly of kimberlite indicator minerals in the Gayot Lake area (press release by Diamondex Resources and Majescor Resources dated July 2, 2002). **Majescor Resources** (projects 10 and 13, Figure 1A-1) completed a till sediment survey on its Fontanges and Bienville properties.

Opportunities for Exploration

The area located west of the Caniapiscau Reservoir lies along the boundary between the Archean La Grande Subprovince to the west and the Ashuanipi Subprovince to the east (Thériault and Chevé, 2001). Nepheline syenite intrusions, assigned to the Niaux Suite, were identified in this area (Thériault and Chevé, 2001), which lies along the eastern segment of the Wemindji-Caniapiscau corridor (Moorhead *et al.*, 1999). The latter study ranked this area as the second most likely area in Québec to host a new kimberlite field. In this area, the corridor is cut by transverse faults oriented NNE. Lineaments and faults oriented at 20-30° form a dominant network in the western part of the Ashuanipi Subprovince (Portella, 1980; Thériault and Chevé, 2001). This network extends northward (Gosselin and Simard, 2000) into the Cambrien Lake area and southward to the Otish basin (Portella, 1980). Portella (1980) mentions that this network is oriented at a slight angle relative to the Kapuskasing tectonic zone and to faults in the Lake Nipigon area in Ontario. From south to north, this fault network, identified as the Mistassini-Lemoyne tectonic zone (Moorhead *et al.*, 2002), hosts kimberlites of the Otish field, syenites of the Niaux Suite, exploration properties held by **SOQUEM Inc./Ashton Mining of Canada** located west of the Caniapiscau Reservoir and in the Gayot Lake area (Birkett, 2000; Lucas, 1999), and carbonatites at Castignon Lake and Lemoyne Lake, located in the Labrador Trough. This network may represent a zone highly permeable to alkalic magmatism, similar to the Kapuskasing tectonic zone in Ontario (Moorhead *et al.*, 1999).

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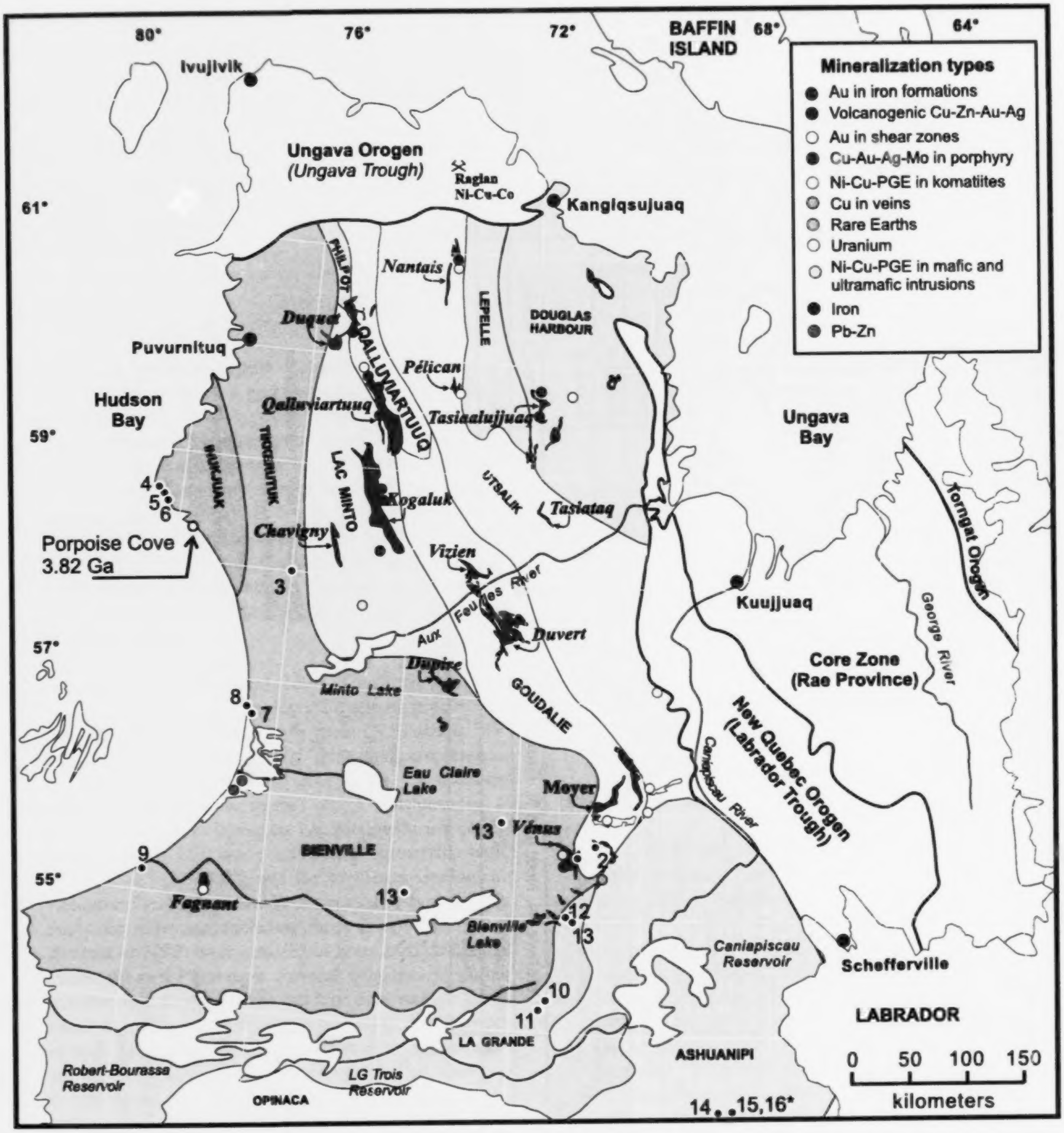
80°
76°
72°
BAFFIN ISLAND
68°
64°
Mineralization types
● Au in iron formations
● Volcanogenic Cu-Zn-Au-Ag
○ Au in shear zones
● Cu-Au-Ag-Mo in porphyry
○ Ni-Cu-PGE in komatiites
● Cu in veins
● Rare Earths
○ Uranium
○ Ni-Cu-PGE in mafic and ultramafic intrusions
● Iron
● Pb-Zn
Ivujivik
Ungava Orogen
(Ungava Trough)
Raglan Ni-Cu-Co
Kangiqsujuaq
61°
PHILPOT
Nantais
LEPELLE
DOUGLAS HARBOUR
Duquet
QALLUVIARTUUQ
Puvurnituq
Pélican
Hudson Bay
Qalluviartuuq
Tasiaalujjuaq
Ungava Bay
59°
INUKJUAK
TIKKERUTUK
LAC MINTO
UTSALIK
Kogaluk
Tasiataq
4
5
6
Porpoise Cove 3.82 Ga
Chavigny
Torngat Orogen
Vizien
3
Aux Feuilles River
Kuujjuaq
George River
Duvert
57°
Dupire
Minto Lake
Core Zone (Rae Province)
GOUDALIE
8
7
New Quebec Orogen (Labrador Trough)
Caniapiscau River
Eau Claire Lake
Moyer
13
Vénus
BIENVILLE
9
2
1
55°
Fagnant
13
12
Bienville Lake
13
Caniapiscau Reservoir
Schefferville
10
11
LABRADOR
LA GRANDE
ASHUANIPI
0 50 100 150
kilometers
Robert-Bourassa Reservoir
LG Trois Reservoir
OPINACA
14
15,16*

FIGURE 1A-1. Location of mining exploration projects in the Minto, Bienville and Ashuanipi subprovinces in 2002. Tectonic domains and the major zones of greenstone belts (in green) of the northern Superior Province are shown in different colors. The Paleoproterozoic volcano-sedimentary basins are illustrated in yellow and the Archean and Paleoproterozoic rocks of the Core Zone (Rea Province), of the Ungava, New Quebec and Torngat orogens are in light yellow. Projects 14, 15 and 16 are located in NTS 23C, south of their actual location. The oldest volcanic rock dated at 3.82 Ga (David *et al.* 2002) from Porpoise Cove is shown as a white circle. *Map modified from Labbé and Lacoste (2002).*

TABLE 1A-1 - Exploration projects in the northern part of the Superior Province in 2002.

N°	FIG.	NTS	COMPANY/PROSPECTOR	PROJECT	SUBSTANCES	WORK[1]
1	1A-1	23M/11	Mines d'Or Virginia inc. / BHP Billiton	Gayot	Ni-Cu-Co-PGE	Pr, G, GpA, Mag, EM, S(8:1563)
2	1A-1	23M/07,10,15,16	Ressources Majescor / Diamondex	Gayot	diamond	Pr, Gc(t)
3	1A-1	34F, G, C, B	Falconbridge Ltée / SOQUEM inc.	East Hudson	Ni-Cu-Co-PGE	Pr, G, E, Gp, Gc(l), S(4:250)
4	1A-1	34L/09	Fonds minier du Nunavik	Inukjuak	Au-Cu-Pb-Zn	Pr
5	1A-1	34L/09	Jacob Palliser	Bates Peninsula	Au-Cu-Pb-Zn	Pr
6	1A-1	34L/09	Peter Tukai	Fivemile Inlet	Au-Cu-Pb-Zn	Pr
7	1A-1	34C/09	Fonds minier du Nunavik	Uniujaq	Cu-Pb-Zn	Pr
8	1A-1	34C/09	Adamie Tooktoo	Sheldrake River	Cu-Pb	Pr
9	1A-1	23N/05	Myva Niviaxie	Black Whale	Pb-Zn	Pr
10	1A-1	23L/03,04,05,06	Ressources Majescor	Fontanges	diamond	Pr, Gc(t)
11	1A-1	23L	Ashton Mining of Canada / SOQUEM inc.	Taiga	diamond	Pr, G, E, Mag, Gc(t)
12	1A-1	23L/14, 23M/03	Ressources Plexmar	Lac Heslin	diamond	Pr, Mag
13	1A-1	23L/14, 23M/03, 33P/04,05,16	Ressources Majescor	Bienville	diamond	Pr, Gc(t)
14	1A-1	23C/10	A. Lefebvre, N. Noël and N. Goulet	Tatou	Cu-Pb-Zn-Au-Ag	Pr, Gc(ro)
15	1A-1	23C/10	Jean Fortin	Courcy A1	Au-Cu	Pr
16	1A-1	23C/10	Jean Fortin	Courcy A-2	Au-Cu	Pr, Mag, E

EXPLORATION WORK LEGEND

E	Sampling	Gp	Undefined geophysical survey
EF	Feasibility or market study	GpA	Airborne geophysical survey
EM	Electromagnetic survey	Int. Sat.	Satellite image interpretation
ET	Technical evaluation study	Mag	Magnetic survey
Ev	Bulk sampling	DPEM	Drillhole pulse electromagnetic survey
G	Geological survey	PP	Induced polarization survey
Gc	Undefined geochemical survey	Pr	Prospecting
Gc(h)	Humus geochemical survey	S(nb:m)	Diamond drilling (number:total metres)
Gc(l)	Lake bottom geochemical survey	Sci	Reverse circulation drilling
Gc(ro)	Rock geochemical survey	T	Trenching and stripping
Gc(ru)	Stream geochemical survey	TBF	VLF electromagnetic survey
Gc(s)	Soil geochemical survey	TM	Metallurgical testing
Gc(t)	Till geochemical survey	*italic*	Underground exploration work
		bold	Advanced-stage project
		▨	MRN subsidized project

James Bay Region Central Part of the Superior Province (Opatica, Opinaca, Nemiscau, and La Grande Subprovinces)

Patrick Houle

The James Bay region occupies the central part of the Superior Province and contains four geological subprovinces including, from north to south, the La Grande, Opinaca, Nemiscau, and Opatica subprovinces. These geological subprovinces, comprising volcano-plutonic and sedimentary assemblages, are transected by numerous E-W to WNW-ESE and NE-SW shear zones. Exploration is mainly focused within the Frotet-Evans (Opatica Subprovince), Lower Eastmain (Opinaca Subprovince), Upper Eastmain (Opinaca Subprovince), and La Grande (La Grande Subprovince) volcano-sedimentary belts.

Between 1996 and 2000, Géologie Québec conducted an extensive geological mapping program in the Lac Sakami and Lac Guyer areas (NTS sheets 33F and 33G), in the La Grande belt. This work, completed in the summer of 2002, provided an opportunity to examine most gold occurrences in this sector. Furthermore, a geological survey covering the Lac Mistassini area (NTS sheets 32I and 32P) was conducted in partnership with the INRS-ETE, DIVEX, and the Mistissini Geological Resources Centre. A dozen Mississippi Valley-type (MVT) lead-zinc showings, including three discovered in the summer of 2002, were sampled in brecciated dolomites of the Albanel Formation. Several copper-rich, shale-mudstone blocks from the former Icon mine and the Perch River deposit were also sampled in detail. Preliminary results indicate that the various types of mineralization are lithologically and structurally controlled, and are systematically enriched in organic matter (Héroux *et al.*, 2002).

In the Near North region, exploration expenditures soared to $18.42 million for the year 2002, an increase of 168 % relative to 2001. This rise is directly related to diamond exploration, which represents 73.8 % of exploration expenses incurred in 2002. Investments for diamond exploration were focused in three areas of interest, namely Nottaway (1.5 %), Wemindji-La Grande (29.5 %), and the Otish Mountains area (69 %). A total of 34,313 m were drilled in 2002, a 113 % increase relative to 2001.

During 2002, 55 exploration projects were reported (see Table 1B-1). The Mineral Exploration Assistance Program (MEAP) funded six projects submitted by prospectors, under components A1 and A2. Furthermore, through the MEAP, the Ministère des Ressources naturelles proceeded with the creation of two agencies to stimulate the development of the mineral potential of the James Bay region, namely the Fonds de prospection minière jamésien and the Cree Mineral Exploration Board. In November 2002, the Ministère des Ressources naturelles confirmed a grant of $225,000 in financial assistance to **Inmet Mining Corporation**, also under the MEAP, to test the depth extension of zone 87 at the Troilus mine.

In 2002, the main types of ore deposits targeted in the James Bay region included lode gold deposits, gold-bearing iron formations, diamond deposits associated with kimberlites, and, to a lesser degree, magmatic nickel deposits (Ni-Cu-PGE) associated with mafic to ultramafic intrusions and porphyry-type Cu-Au deposits associated with felsic intrusions.

The James Bay region is divided into three sectors, which are, from south to north, the Frotet-Evans area, the Eastmain area, and the La Grande area. The most significant projects currently underway are reviewed and discussed below, based on the interest generated in 2002.

Frotet-Evans Area

The Frotet-Evans volcano-sedimentary belt (FEVB) forms an upper crustal thrust sheet oriented E-W. It lies in the centre of the Opatica Subprovince (Boily and Dion, 2002). As for most greenstone belts in the Superior Province, the FEVB is composed mainly of volcanic formations, both tholeiitic and calc-alkalic. These volcano-sedimentary rocks are metamorphosed to the greenschist facies in the centre of the belt and to the upper amphibolite facies near the contacts with Opatica gneisses. They are intruded by various syn- to late-tectonic gabbroic to monzogranitic suites. The FEVB is roughly 250 km long and is subdivided into four lithotectonic segments, from west to east: 1) Evans-Ouagama, 2) Storm-Evans, 3) Assinica, and 4) Frotet-Troilus. In the Frotet-Evans area, 8 projects totalling $0.36 million, which represents about 2 % of total off-minesite exploration expenditures in the James Bay region, were carried out.

The eastern part of the Frotet-Evans belt (Frotet-Troilus segment) hosts a few massive sulphide deposits as well as extensive Cu-Au-Ag porphyry-type deposits, such as the Troilus mine operated by **Inmet Mining Corporation**. Variably differentiated mafic to ultramafic sills are an important component in certain sectors of the Frotet-Troilus segment. These stratiform intrusions offer an excellent potential for the discovery of Ni-Cu-PGE deposits. **Normabec Mining Resources** and **SOQUEM Inc.** outlined a large platinum-palladium anomaly on the Albanel property (project 31, Figure 1B-1). It extends for more than 1,600 m in length and 150 m in width, and consistently grades higher than 50 ppb Pt-Pd. Also, stripping and sampling conducted in the northern part of the Dompierre property (project 30, Figure 1B-1), located 15 km west of the Albanel property, yielded anomalous results, including 606 ppb Pt+Pd over 1 m, 214 ppb Pt+Pd over 9 m (including 485 ppb Pt+Pd over 1 m), and 179 ppb Pt+Pd over 8 m in trench TR-02-08. The Albanel and Dompierre properties are located along a multi-kilometre-long zone defined by a strongly magnetic lineament. This magnetic anomaly corresponds to the presence of pyroxenite and gabbro intrusions, prospective for Pt-Pd mineralization. To date, anomalous PGE zones are all located along this axis.

Eastmain Area

The Eastmain area comprises the Lower Eastmain greenstone belt (Lower Eastmain and Middle Eastmain segments) and the Upper Eastmain greenstone belt (Upper Eastmain segment). Recent mapping conducted in the Lower and Middle Eastmain (Moukhsil and Doucet, 1999; Moukhsil, 2000; Moukhsil *et al.*, 2001; Moukhsil and Legault, 2002) delineated several Archean volcano-sedimentary assemblages grouped into eight formations, namely the Anatacau-Pivert, Komo, Kauputauch, Kasak, Wabamisk, Clarkie, Auclair, and Natel formations. All of these rocks are cut by numerous intrusions with compositions ranging from monzonitic to monzogranitic, and mafic to ultramafic (metapyroxenite), as well as by quartz-feldspar and/or feldspar porphyry dikes (dioritic). ENE-WSW and E-W deformation zones transect the rocks in the area.

Several Proterozoic diabase dikes of variable thickness (< 30 m), occasionally visible on aeromagnetic maps, traverse the area. They are oriented principally NW-SE, N-S, or NE-SW. These dikes are massive and magnetic, and locally contain plagioclase phenocrysts and traces of pyrite. They are assigned to the Mistassini (NW-SE), Matachewan (N-S), and Senneterre (NE-SW) dike swarms, based on their orientation and a few age determinations obtained elsewhere in the James Bay region.

In the Eastmain area, 30 projects were reported, for a total of $11.16 million, which represents 60.5 % of total off-minesite exploration expenditures in the James Bay region. In the Lower Eastmain and Middle Eastmain segments, exploration is largely focused on lode gold deposits, iron-formation-hosted gold deposits, volcanogenic massive sulphides, and Cu-Au±Ag porphyry-type intrusions. Diamond exploration projects, on the other hand, are mainly concentrated in the granitoids and paragneisses that border the Upper Eastmain greenstone belt (Otish Mountains area).

In the Middle Eastmain segment, **Eastmain Resources** and its joint venture partner **SOQUEM Inc.** delineated the vertical extension of the Eau Claire gold deposit to a depth of 550 m on the Clearwater project (project 37, Figure 1B-1). All drillholes, spread out over a lateral distance of 1.1 km, intersected 107 high-grade, quartz-carbonate-tourmaline veins, including 25 veins ranging from 1.5 to 9 m wide with grades of 5.03 to 22.8 g/t Au. The latter occur within a widespread, mineralized, schistose halo identical to that observed on surface. A reinterpretation of the volcanic stratigraphy on the property, carried out in 2002, proved useful in understanding the Eau Claire deposit (indicated and inferred resource of 1,482,565 tonnes at 7.62 g/t Au – December 2001), which is hosted in amphibolite-grade rocks. A flow top breccia unit was traced in most drillholes, thereby providing a distinctive marker horizon. Furthermore, granitic rocks initially mapped as tonalite are now classified as felsic porphyries, similar to those found in certain gold deposits in the Abitibi Subprovince. Note that the Clearwater property is located a few kilometres north of Hydro-Québec's future Eastmain-1 hydroelectric complex, which will be accessible via a permanent roadway in the spring of 2003.

The Upper Eastmain segment, known for its gold (former Eastmain mine – NTS 33A/08), base metal, and PGE potential, continues to generate substantial interest for diamond exploration. Following the announcement of the first diamond-bearing kimberlite discoveries, Renard 1 and Renard 2, in December 2001, **Ashton Mining of Canada** and **SOQUEM Inc.** intersected in drillhole six more diamondiferous kimberlitic bodies (Renard 3, 4, 5, 6, 7, and 8) on the Foxtrot property (project 2, Figure 1B-1). The diamond-bearing kimberlites (*the central zone*) define a swarm covering 2 km^2, drilled to a depth of 100 to 200 m, which cross-cuts gneisses of the Opinaca Subprovince. Bulk samples of 2.44 tonnes, 4.88 tonnes, and 4.81 tonnes were extracted from kimberlites Renard 2, 3, and 4, respectively. In June 2002, the two companies announced the recovery of 1.69 carats of diamonds in the bulk sample from the Renard 2 pipe, for an estimated grade of 0.69 carat per tonne (69.3 ct/100 t – diamonds larger than 0.85 mm). In November, the bulk sample from Renard 4 yielded 3.11 carats for a grade of 0.65 carat per tonne (64.7 ct/100 t). In December, the high grade of the Renard 3 linear kimberlite body was confirmed, with 6.54 carats of diamonds larger than 0.85 mm, for an estimated grade of 1.34 carats per tonne (134 ct/100 t). Although additional drilling is required to properly delineate known kimberlites in the Renard swarm, certain parts of the Foxtrot property demonstrate a strong potential for the discovery of additional diamondiferous kimberlites. For example, certain geophysical anomalies linked to the presence of indicator minerals have yet to be explained. Among these, a high-priority target about 150 m south of Renard 4 remains untested.

In the southwest part of the Otish Mountains area, **Ditem Explorations** and joint venture partner **Pure Gold Minerals** discovered in drillhole two new kimberlitic bodies, dubbed H-1 and H-2, on the Tichegami River property (project 8, Figure 1B-1). Kimberlite pipe H-1 failed to yield diamonds from the caustic fusion analysis of about 100 kg of material. However, a microdiamond was recovered from a 23.15-kg sample collected from kimberlite H-2, located 350 m southeast of H-1. Furthermore, fieldwork conducted by the joint venture identified three distinct kimberlitic phases, with the presence of pyrope garnet, ilmenite, and chrome diopside. These results from the Tichegami River property, located about 20 km north of the Lac Beaver kimberlite (Brack, 1998, 1999; Bernier and Moorhead, 2000; Girard, 2001), confirm the potential to discover additional kimberlites in the Lac Beaver-Mistassini sector, south of the Otish Mountains area.

In 2002, several companies conducted till sampling programs and high-resolution airborne geophysical surveys in the southern part of the Otish Mountains area. The presence of kimberlite indicator minerals such as pyrope, eclogitic garnet, chromite, and picro-ilmenite was confirmed, some of which exhibit fragile reaction rims on surface, suggesting short transport distances from kimberlitic sources.

La Grande Area

The La Grande area comprises three major Archean assemblages, Proterozoic dikes, and a series of grabens filled with siliciclastic sediments of the Paleoproterozoic Sakami Formation. Archean assemblages include the Bienville plutonic Subprovince to the northwest, the La Grande volcano-plutonic Subprovince in the centre, and the metasedimentary and plutonic Opinaca Subprovince to the southeast. La Grande rocks are comparable to those in the Sachigo-Uchi-Wabigoon subprovinces in northwestern Ontario, whereas the Opinaca Subprovince is comparable to the English River and Quetico subprovinces in Ontario (Goutier *et al.*, 2002). The metamorphic grade increases from the greenschist facies in the centre of the La Grande area to the amphibolite facies outwards, towards the north and southeast.

The La Grande volcano-sedimentary belt (LGVB), included in the La Grande Subprovince, hosts the vast majority of reported showings. The LGVB, parallel to the Wemindji-Caniapiscau structural corridor, is composed mainly of mafic to felsic volcanic rocks, interstratified with metasediments and oxide-facies or magnetite iron formations. Komatiitic flows and ultramafic intrusions, locally hosting Ni-Cu±PGE and Cr occurrences, are also scattered throughout the area. In the LGVB, exploration has mainly focused on the search for deposits associated with gold-bearing iron formations, volcanogenic alteration zones (Cu-Zn-Ag±Au), quartz-sulphide veins (Cu-Au±Ag), and magmatic chrome and platinum group element mineralization. The search for diamond-bearing kimberlites and lamprophyre dikes also accounts for a significant proportion of exploration expenses.

The La Grande area was the object of 17 projects totalling $6.9 million, which represents 37.5 % of total off-minesite exploration expenditures in the James Bay region. Exploration projects are clustered in two regions: the western and the eastern La Grande sectors.

At the westernmost end of the La Grande Subprovince, **Majescor Resources** announced in April 2002 the discovery of subhorizontal kimberlite sills on its Wemindji property (project 41, Figure 1B-1), located 30 km east of the Wemindji Cree community. Fifteen drillholes, testing a surface area of 400 m by 500 m, intersected the kimberlite. Intersections are 2 m thick on average, and occur between 4 and 32 m below surface. Given the thin layer of overburden, an excavation program was undertaken in the summer of 2002 to collect a bulk sample. This 8.5-tonne kimberlite sample was then processed to extract diamonds larger than 0.85 mm. No diamonds were recovered. However, two microdiamonds were recovered from a 190-kg sample of kimberlite analyzed by caustic fusion. These stones measure 0.6 x 0.58 x 0.46 mm and 0.44 x 0.34 x 0.08 mm.

In the same area, **Dianor Resources** identified over 400 lamprophyre dikes, ranging from 1 to 34 m wide, and 10 heterolithic breccia centres on their James Bay property (project 49, Figure 1B-1). Three microdiamonds were recovered from three lamprophyre dikes also hosting crustal xenoliths. The distribution of dikes and heterolithic breccias suggests most of the dikes and breccias are spatially related to the intersection between the Wemindji-Caniapiscau corridor and the projected extension of the Kapuskasing (Ontario) structural zone (Ryder, 2002). Moreover, follow-up work on the five heterolithic breccia centres in the Astrée Lake area led to the discovery of the Zodiac showing. The latter contains a lithological sequence similar to that observed at Wawa, Ontario: heterolithic intrusive breccias, pyroclastic flows, tuffs, and deformed lamprophyres.

In the western La Grande sector, **Matamec Explorations** reported numerous gold-bearing drill intersections from zones 25 and 26, on the "La Pointe" project, Sakami property (project 42, Figure 1B-1). Zone 25 is characterized by stratiform gold mineralization in a silicified sequence of quartzite, arkose, and felsic dikes in paragneisses of the Opinaca Subprovince. This mineralized zone occurs in an antiform-synform structure plunging moderately to the southwest. The thickest part of the mineralized zone developed in the hinge of two inferred folds with drill intersections of 2.62 g/t Au over 54.70 m (drillhole Ex-10) and 4.16 g/t Au over 21.00 m (drillhole Ex-22). A large low-grade halo, at about 1 g/t Au, characterizes the zone, and also includes higher grade sections from 1 to 3 g/t Au. Nearby, in zone 26, gold is hosted in a sulphide-facies iron formation within a mafic volcanic sequence of the La Grande Subprovince. This zone occurs in an inferred synclinal hinge zone that plunges moderately to the southwest, and includes the best interval: 13.67 g/t Au over 7.35 m. Zones 25 and 26 are both located less than 50 m away from the contact between the La Grande and Opinaca subprovinces.

On the La Grande Sud property (project 50, Figure 1B-1), **Cambior** and **Virginia Gold Mines** investigated the extensions of zones 32 and 30. Drillhole LGS02-198, collared about 200 m east of the end of zone 32 (mineral inventory of 4.2 Mt at 2.1 g/t Au and 0.2 % Cu – March 1999), yielded an interval grading 4.4 g/t Au over 7.40 m. This drillhole confirms the continuation of the gold system, which remains open laterally eastward and at depth. The gold intersection occurs in the tonalite hosting zone 32, within a silica or albite alteration zone. The gold zone is characterized by about 5 % minor quartz-chalcopyrite veins and pyrite-chalcopyrite stringers. The northern extension of zone 30, on the other hand, identified in 2001, was tested by drillhole LGS02-197, which intersected a slightly silicified interval with disseminated pyrite and chalcopyrite. This intersection graded 8.7 g/t Au over 4.6 m (grade cut at 34.29 g/t Au). This includes an assay of 63.2 g/t Au over 80 cm, incorporating material from a 24-cm thick vein with visible gold. Drillhole LGS02-203, testing zone 30 to the south of drillhole LGS02-197, intersected 3.2 m at 3.2 g/t Au. Although the sulphide content is low, zone 30 is commonly sub-economic and is defined by a roughly north-south mineralized halo.

In the eastern segment of the La Grande Subprovince, **Virginia Gold Mines** and **GlobeStar Mining Corporation** (formerly TGW Corporation) confirmed in drillhole the continuity of the Orfée zone westward and at depth, on the Poste Lemoyne property (project 52, Figure 1B-1). Results from drillhole PL02-31 (13.0 m at an uncut grade of 14.13 g/t Au) demonstrate the extension of the high-grade zone to a vertical depth of more than 200 m. However, it appears to be much less continuous towards the east, where it is crosscut by pegmatites. Several geophysical and geochemical anomalies were detected along a 5-km segment of the structural corridor that hosts the Orfée zone.

The Orfée zone and zones 25-26, held by **Matamec Explorations** (project 42, Figure 1B-1), occur in comparable geological settings, *i.e.* along a deformation corridor at the contact between mafic volcanic rocks of the La Grande Subprovince (Yasinski and Guyer groups) and paragneisses of the Opinaca Subprovince. Silicate- and oxide-facies iron formation horizons are interstratified with feldspathic wackes and felsic volcanic rocks (project 42, Figure 1B-1), and intruded by felsic (tonalite, pegmatite) and intermediate intrusions. Zones with pyrrhotite-pyrite-arsenopyrite mineralization coincide with thickened and faulted portions of fold hinges affecting the iron formations and country rocks (Dion and Goutier, 2002).

On the Noella property (project 54, Figure 1B-1) in the Caniapiscau area, **Virginia Gold Mines** traced, in trenches, a gold-bearing iron formation over a distance of more than 1.2 km along strike. The Bear showing, near the hinge of an east-plunging, km-scale, open fold, occurs in a mineralized sheet roughly 100 m long. This sheet yielded high gold grades in channel samples, namely 4.1 g/t Au over 5.4 m, 5.4 g/t Au over 4.9 m, 10.84 g/t Au over 4.0 m, and 6.56 g/t Au over 4.0 m. The new Bourdon showing, located more than 1 km to the northeast of the Bear sector, yielded grades of 5.33 g/t Au over 10.7 m in channel samples, including 10.27 g/t Au over 4.7 m.

Still in the eastern part of the La Grande Subprovince, **Sirios Resources** and **SOQUEM Inc.** conducted an induced polarization survey which outlined numerous anomalies. These are associated with disseminated to semi-massive sulphides around the periphery of the quartz-carbonate vein system on the Aquilon property (project 53, Figure 1B-1). Two of these anomalies, located near the Sortilèges Dorés showing, were tested by two drillholes, which yielded intersections grading up to 1.94 g/t Au over 1.49 m and 3.6 g/t Au over 1 m. On the Lingo-West vein, a few short holes from 6 to 30 m in length were drilled within an area of 30 m by 60 m. The main results were: 35.99 g/t Au over 2 m, 77.81 g/t Au over 1.0 m, 13.15 g/t Au over 2.0 m, 3.85 g/t Au over 4.6 m, 6.89 g/t Au over 1.5 m, 4.23 g/t Au over 1.5 m, 3.5 g/t Au over 1.0 m, 3.9 g/t Au over 0.75 m, 2.36 g/t Au over 3.25 m, and 1.54 g/t Au over 1 m. The Aquilon volcanic belt, which underlies the Aquilon property, covers a total surface area of nearly 250 km^2.

In the James Bay region, strong positive magnetic anomalies are generally associated with iron formations. In these formations, disseminated sulphides may also be detected from electromagnetic or induced polarization anomalies. In geochemistry, particularly in humus surveys, the most useful indicator elements for this type of mineralization are gold and arsenic, as illustrated by the Golden Gap showing (NTS sheet 33G/09): 14.3 g/t Au over 2 m in a channel sample. Fold hinges and transverse or longitudinal deformation zones affecting these iron formations are favourable sites for gold remobilization and local enrichment. Consequently, all iron formations located along the contact between major lithostratigraphic domains (sedimentary-volcanic) remain prime targets for the discovery of high-grade gold deposits.

Opportunities for Exploration

The latest U-Pb analyses performed on a perovskite concentrate from the Lac Beaver kimberlite pipe (**Ditem Explorations**) yielded an age of 550.9 ± 3.5 Ma. This age is very similar to that of alkalic intrusions found along the Saguenay rift, which is a continental rift along the southern margin of Laurentia marking the opening of the Iapetus Ocean. The three kimberlites of the Lac Beaver sector and the eight Renard kimberlites (90 km north of Lac Beaver) are located at the southernmost end of the Mistassini-Lemoyne structural zone (MLZ). This zone extends for 650 km in a NNE direction (025°) in the east-central part of the Superior craton, from the Proterozoic Mistassini sedimentary basin to the Labrador Trough. The MLZ is defined by lineaments and late faults oriented NNE interpreted from remote sensing data. Several diamond exploration properties are located along the MLZ, which appears to be the dominant structure controlling the emplacement of kimberlites in the east-central part of the Superior craton (Moorhead *et al.*, 2002). Portella (1980) notes that this structure is subparallel to the Kapuskasing tectonic zone, located in Ontario, which hosts several types of alkalic intrusions, including kimberlites.

The MLZ, very rich in kimberlite intrusions, may very well extend south into the Chibougamau area. If so, the southern extension of the MLZ would intersect the Monts Témiscamie nepheline syenite east of Albanel Lake, and the margin of the Superior craton located southeast of the Grenville Front. This sector, east of Chibougamau, could have a significant potential for diamond-bearing lamproites. Despite the absence of direct evidence for kimberlites and indicator minerals along the southern extension of the MLZ, the presence of late faults subparallel to the Grenville Front and of igneous activity south of Mistassini Lake suggests a certain potential for the discovery of alkalic, and possibly kimberlitic, igneous rocks south of the Mistassini sedimentary basin.

As well, the eastern part of the Wemindji-Caniapiscau corridor, in the area adjacent to the Caniapiscau Reservoir, remains very promising for kimberlite exploration. This sector is contained within the MLZ, and represents one of the areas of interest defined by Moorhead (1999) in the Superior craton.

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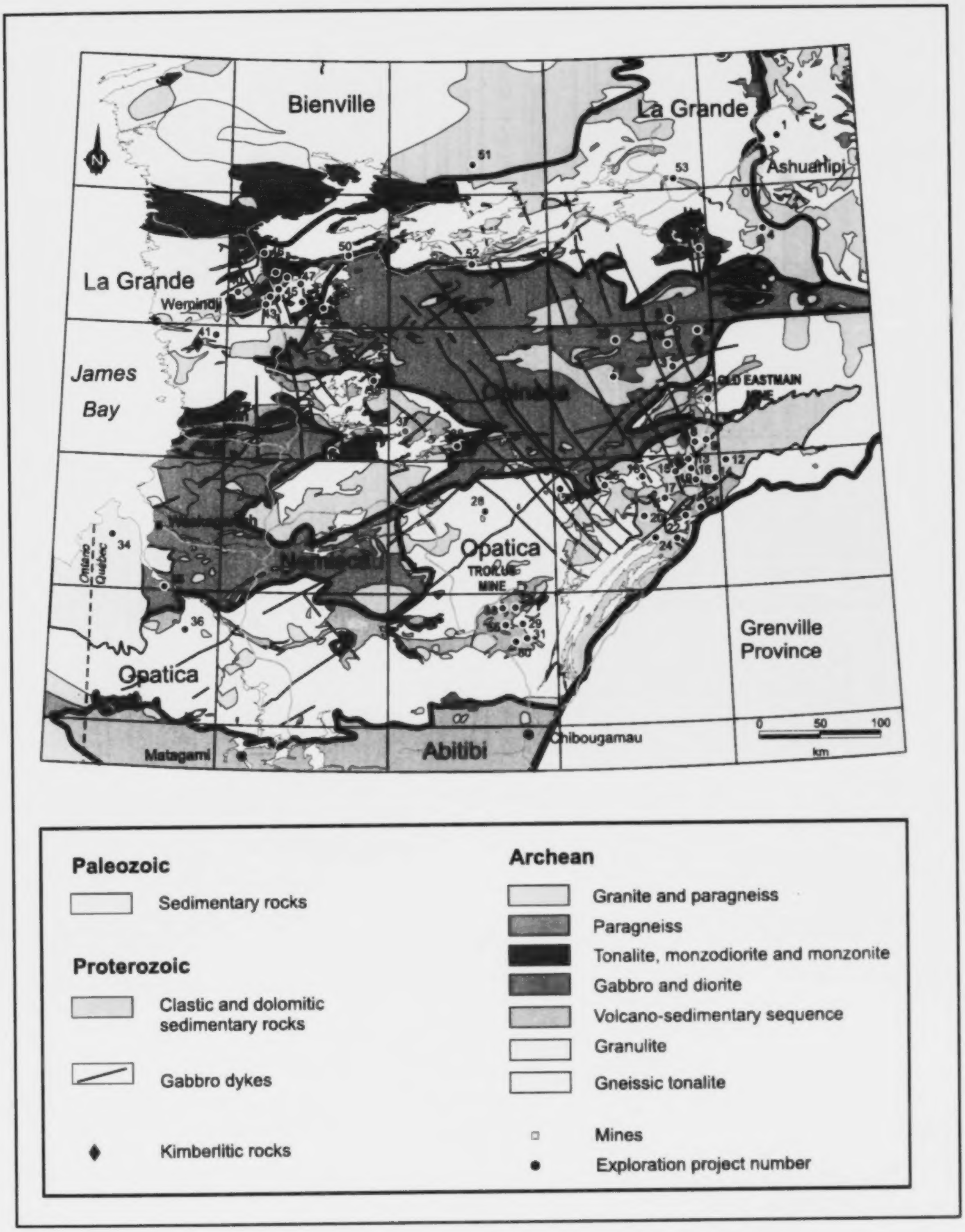
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La Grande
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La Grande
Wemindji
James Bay
OLD EASTMAIN MINE
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TROILUS MINE
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0 50 100
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Paleozoic
Sedimentary rocks
Proterozoic
Clastic and dolomitic sedimentary rocks
Gabbro dykes
Kimberlitic rocks
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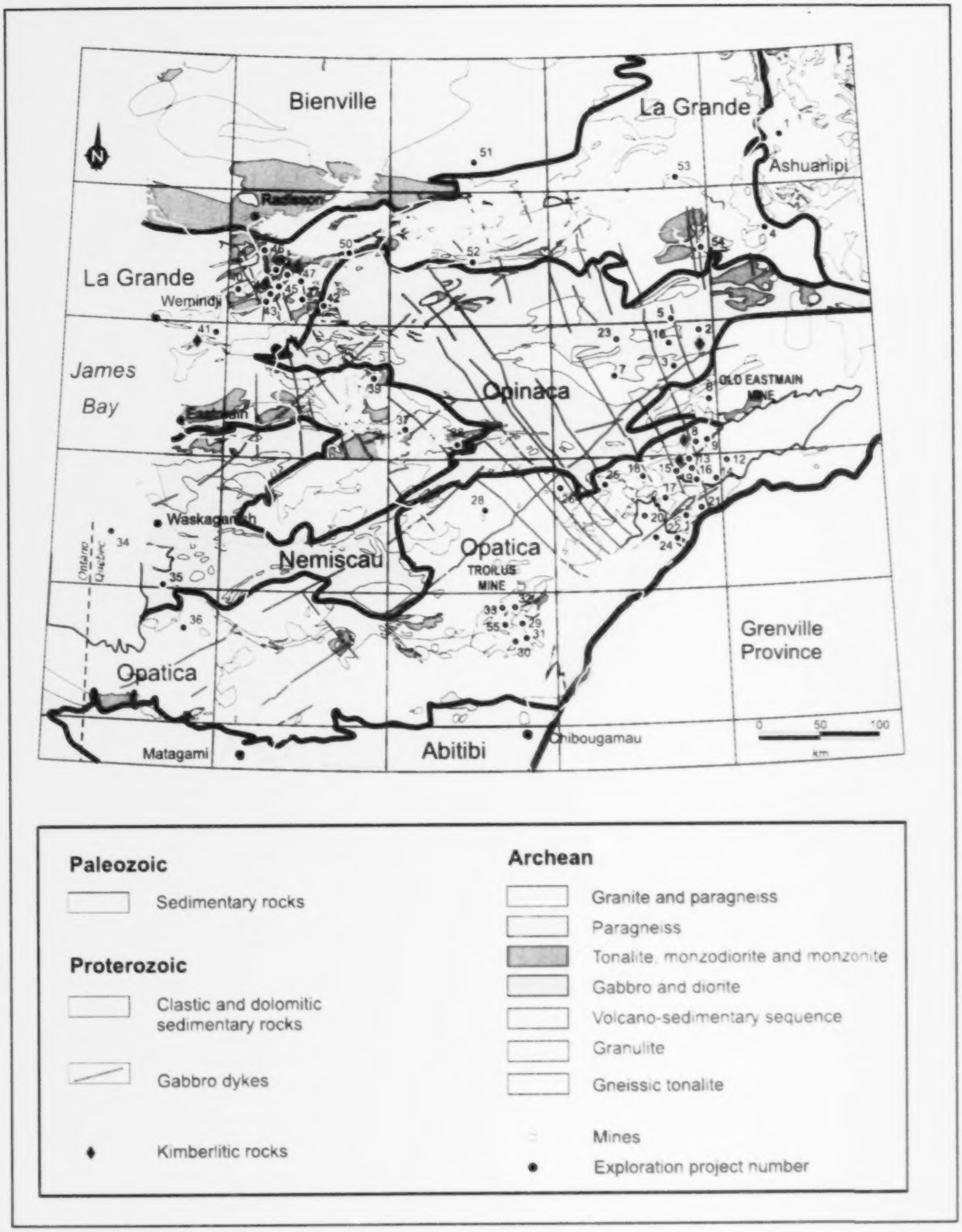
Paragneiss
Tonalite, monzodiorite and monzonite
Gabbro and diorite
Volcano-sedimentary sequence
Granulite
Gneissic tonalite
Mines
Exploration project number

Figure 1B-1. Location of exploration project sites in the James Bay area for 2002.


Bienville
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Paleozoic
Sedimentary rocks
Proterozoic
Clastic and dolomitic sedimentary rocks
Gabbro dykes
Kimberlitic rocks
Archean
Granite and paragneiss
Paragneiss
Tonalite, monzodiorite and monzonite
Gabbro and diorite
Volcano-sedimentary sequence
Granulite
Gneissic tonalite
Mines
Exploration project number

Figure 1B-1. Location of exploration project sites in the James Bay area for 2002.

TABLE 1B-1 - Exploration projects in the James Bay area for 2002.

N°	FIG.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCES	WORK(1)
1	1B-1	23L/03, 23L/06-07, 23L/10-11	Dios Exploration	Fontanges	Diamond	Gc(t)
2	1B-1	33A/09, 33A/15-16, 33H/01	Ashton Mining of Canada and SOQUEM inc.	Foxtrot	Diamond	GpA,Gc(t),Mag,S(33:4300)
3	1B-1	33A/06-07-08-09-10-11, 33H/01-02, 33A/15-16	Majescor Resources and BHP Billiton Diamonds	Portage	Diamond	GpA,Gc(t),Mag,EM,S(18:1087)
4	1B-1	23E/07, 23E/10	Majescor Resources and Dunsmuir Ventures	Portage East Extension	Diamond	GpA,Gc(t)
5	1B-1	33A/01, 33A/07-08-09-10, 23D/05, 23D/12, 23D/14, 33H/01-02	Dios Exploration	33 Carats	Diamond	Pr,Gc(t)
6	1B-1	33A/08	Stratabound Minerals Corporation	Marusia	Diamond, Cu-Ni-PGE	GpA
7	1B-1	33A/11, 23D, 23E	Dianor Resources	Otish	Diamond	Pr,Gc(t),Gc(s),Mag
8	1B-1	33A/01	Ditem Explorations and Pure Gold Minerals	Tichegami	Diamond	Pr,Gc(t),Mag,EM,S(8:502)
9	1B-1	33A/01	Ditem Explorations	Franks	Diamond	Pr,GpA,Gc(t),Mag
10	1B-1	23D/13, 33A/15, 33A/01	Canalaska Ventures	Otish	Diamond	Pr,GpA,Gc(t)
11	1B-1	33A/01-02, 32P/01, 32P/07-08-09-10-11, 32P15-16	Ashton Mining of Canada and SOQUEM inc.	Tichegami	Diamond	Pr,GpA,Gc(t)
12	1B-1	22M/13	Ditem Explorations	Matoush	Diamond	Pr,GpA,Gc(t)
13	1B-1	33A/01, 32P/16	Ditem Explorations and Pure Gold Minerals	Beaver Lake	Diamond	Gc(t)
14	1B-1	32P/16	Ditem Explorations	Toco	Diamond	Pr,GpA
15	1B-1	32P/16	Ditem Explorations and Pure Gold Minerals	Beaver Lake South	Diamond	Pr,GpA,Gc(t)
16	1B-1	33A/01, 32P/16	Strateco Resources	Cardinal	Diamond	GpA,Gc(t)
17	1B-1	32P/09-10, 32P/15-16	Dios Exploration	Hotish	Diamond	GpA,Gc(t)
18	1B-1	32P/07, 32P/09-10-11, 32P/15-16, 33A/02-03	Majescor Resources and Canabrava Diamond Corporation	Mistassini	Diamond	Pr,G,GpA,Gc(t),S(10:375)
19	1B-1	32P/09, 32P/16	Plexmar Resources	Otish	Diamond	GpA,Gc(t),Mag
20	1B-1	32P/06-07, 32P/10-11	Plexmar Resources	Papaskwasati	Diamond	GpA,Gc(t),Mag
21	1B-1	32P/09	Bard Ventures and Otish Mountain Syndicate	Otish 6	Diamond	GpA
22	1B-1	32P/07-08, 22M, 22L, 22N	Bitterroot Resources	Mistassini	Diamond, Cu-Ni-PGE	Pr,Gc(t),Gc(ro),Mag
23	1B-1	33A/14	Sparton Resources	Otish Diamond	Diamond	Gc(t)
24	1B-1	32P/07	Pauline Godbout and Manou Dessertine	P.G.M.D.	Diamond	Pr,Gc(t)

TABLE 1B-1 - Exploration projects in the James Bay area for 2002.

N°	FIG.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCES	WORK[1]
25	1B-1	32P	Xemac Resources	Mistassini ouest	Diamond	GpA
26	1B-1	32P/13	Ditem Explorations	Eastmain	Diamond	GpA
27	1B-1	32F/03-04	Philippe Letourneur	Langelier PL-02	Diamond, Cu-Ni-PGE	Pr,E
28	1B-1	32O/10	Exploration Miro	Lac Accordéon	Au, Diamond, Cu-Ni	Pr,E
29	1B-1	32J/09, 32J/16	François Bouchard-Michel Leblanc	Savignac	Diamond	Gc(t),Gc(s)
30	1B-1	32J/10	Normabec Mining Resources and SOQUEM inc.	Dompierre (1328)	PGE	Pr,G,T,E,Mag,PP,S(3:510)
31	1B-1	32J/09-10	Normabec Mining Resources and SOQUEM inc.	Albanel (1341)	PGE	Pr,G,T,E
32	1B-1	32J/15	SOQUEM inc.	Testard (1314)	Cu-Au	Mag,PP
33	1B-1	32J/10	SOQUEM inc. and Graniz Mondal	Troilus sud (1332)	Cu-Zn-Au-Ag	Pr,E,T
34	1B-1	32M, 32L	Dumont Nickel	Hernia	Diamond	S(8:-)
35	1B-1	32M/01-02	Poplar Resources	Nottaway Central	Diamond	Gc(t)
36	1B-1	32L/09-10, 32L/15-16, 32M/01-02	Majescor Resources	Nottaway Nord	Diamond	Gc(t)
37	1B-1	33B/04	Eastmain Resources and SOQUEM inc.	Clearwater	Au	T,E,G,Gc(s),S(22:10512)
38	1B-1	33B/03	Virginia Gold Mines and Kinross Gold Corporation	Auclair	Au	S(9:1303)
39	1B-1	33C/09	Virginia Gold Mines	Éléonore	Cu-Au	Pr,E
40	1B-1	33D/15	Orezone Resources and Patrician Diamonds	Wemindji	Diamond	Gc(t)
41	1B-1	33D/15-16, 33E/01-02	Majescor Resources	Wemindji	Diamond	T,E,Gc(t),Mag,EM,Gp,S(22:1351)
42	1B-1	33F/02-07	Matamec Explorations	Sakami	Au	Pr,G,PP,Mag,S(36:5500)
43	1B-1	33F/03-04	AntOro Resources	Wapiscan	Diamond, Cu-Au-Ag	Pr,E,Gc(h),Gc(t)
44	1B-1	33F/06	Pro-Or Mining Resources	Ménarik	Cr-Pd-Pt-Ni-Cu	Mag,EM,E
45	1B-1	33F/05-06	Searchgold Resources	Yasinski-North	Diamond, Au-Cu- Ni-Zn	Pr,Gc(t),Gc(Ro)
46	1B-1	33F/06	Paul Adomatis	Blue Jay	Diamond	Pr,Gc(t),
47	1B-1	33F/06	Gordon Henriksen	Whisky Jack	Diamond	Pr,Gc(t)
48	1B-1	33F/06	Guy Galarneau	Radisson	Diamond, Cu-Zn-Au	Pr,E
49	1B-1	33D, 33E, 33F	Dianor Resources	James Bay	Diamond	Pr,G,Gc(ro),Gc(s),Gc(t),Mag,GpA
50	1B-1	33F/07, 33F/09-10	Virginia Gold Mines and Cambior	La Grande sud	Au	EM,S(11:4184)
51	1B-1	33G, 33J	De Beers Canada Exploration	LG-3	Diamond	GpA,Gc(t)
52	1B-1	33G/06	Virginia Gold Mines and GlobeStar Mining Corporation	Poste Lemoyne Ext.	Au	S(29:5157)
53	1B-1	32I/01-02	Sirios Resources and SOQUEM inc.	Aquilon(1295)	Au-Cu-Zn	Pr,G,PP,S(19:835)
54	1B-1	33H, 23E	Virginia Gold Mines	Noella	Au	T,G,E
55	1B-1	32J/15	Roméo Boisvert and Gérard Robert	Roméo Boisvert	Cu-Zn-Au-PGE	Pr,E

EXPLORATION WORK LEGEND

E	Sampling
EF	Feasibility or market study
EM	Electromagnetic survey
ET	Technical evaluation study
Ev	Bulk sampling
G	Geological survey
Gc	Undefined geochemical survey
Gc(h)	Humus geochemical survey
Gc(l)	Lake bottom geochemical survey
Gc(ro)	Rock geochemical survey
Gc(ru)	Stream geochemical survey
Gc(s)	Soil geochemical survey
Gc(t)	Till geochemical survey

Gp	Undefined geophysical survey
GpA	Airborne geophysical survey
Int. Sat.	Satellite image interpretation
Mag	Magnetic survey
DPEM	Drillhole pulse electromagnetic survey
PP	Induced polarization survey
Pr	Prospecting
S(nb:m)	Diamond drilling (number:total metres)
Sci	Reverse circulation drilling
T	Trenching and stripping
TBF	VLF electromagnetic survey
TM	Metallurgical testing
italic	Underground exploration work
bold	Advanced-stage project
▨	MRN subsidized project

Southern Part of the Superior Province (Abitibi and Pontiac Subprovinces)

Pierre Doucet
James Moorhead
Suzanne Côté

Introduction

The Abitibi and Pontiac subprovinces form the southern part of the Superior Province in Québec. The Abitibi Subprovince is the largest, one of the most studied, and among the richest Archean greenstone belts in the world. It comprises numerous granitoid intrusions and volcanic and sedimentary belts oriented roughly E-W (Figure 1C-1), dated between 2.75 and 2.67 Ga. Volcanic units are composed of ultramafic to mafic, mafic, or mafic to felsic assemblages. Sedimentary rocks occur along narrow bands that separate volcanic assemblages. They are generally composed of clastic units that represent former deep-water basins (Abitibi-type rocks), whereas smaller bands located along major faults in the southern part of the subprovince represent shallow-water basins (Timiskaming-type rocks). Plutonic rocks are subdivided into eight major magmatic suites, based on their composition and structure (Rive *et al.*, 1990). The Abitibi belt is transected by several major reverse or normal faults oriented E-W to NW-SE, as well as by sinistral NE-trending and dextral SE-trending faults that dissect volcano-sedimentary domains into lozenge-shaped segments cored by intrusive rocks.

The Pontiac Subprovince is separated from the Abitibi Subprovince by the Cadillac-Larder Lake Break, a structure that extends from east to west over a distance of more than 100 km in Québec and Ontario. The Pontiac Subprovince comprises granitoid intrusions and orthogneisses in its central part, along with detrital sedimentary rocks and paragneisses with a few volcanic sequences. The latter form ultramafic, mafic, and locally felsic assemblages in the southwestern part of the Pontiac. A few thin bands of mafic to ultramafic volcanic rocks are also present in the northern part of the subprovince. Undeformed sedimentary rocks of the Proterozoic Cobalt Group unconformably overlie (in erosional unconformity) the southwestern Pontiac and, farther north, a segment of the Cadillac-Larder Lake Break. Eastward, the Abitibi and Pontiac subprovinces are bounded by the Grenville Front, a Proterozoic tectonic zone that extends for 1,200 km in Québec alone. The northern boundary of the Abitibi Subprovince consists of late fault zones intruded by late, weakly deformed to undeformed granitoids.

The Abitibi Subprovince is world-renowned for the great number and high grade of its precious metal (Au-Ag) and polymetallic (Cu-Zn-Au-Ag and Cu-Au) ore deposits. A few metallic deposits, architectural stone quarries, and industrial mineral (lime, quartz, kyanite, mica, and garnet) operations are also present in the Pontiac Subprovince. Exploration and mining have made this territory one of the main mining regions in Québec for close to a century.

In 2002, the number of gold exploration projects reached 92 (Table 1C-1); these projects required investments of nearly $23.56 million. Compared to the 62 exploration projects reported in 2001, this number represents an increase of 48.39 %, whereas the amount invested soared by 112.83 % when compared to the $11.07 million invested last year.

A number of significant developments occurred in the Val-d'Or area in 2002. **McWatters Mining** continued development work at the Sigma-Lamaque complex, including overburden and waste removal from the open pit mine and expansion of the milling capacity from 3,000 to 5,000 tonnes per day. The mill was inaugurated on November 27, and the company proceeded with the first gold pour derived from the Sigma open pit on December 24, 2002. Commercial production is slated to begin early in 2003. Proven and probable reserves at the Sigma-Lamaque complex stand at 10,297,870 metric tonnes at a grade of 2.67 g/t Au. A drill program to test exploration targets in the hanging wall of the Kiena mine, shut down in September, delineated two new gold zones, P and R, which together contain a resource of 1,178,700 metric tonnes at a grade of 4.25 g/t Au. This $1.8-million exploration program will take place over two years. In January 2002, production gradually resumed at the Beaufor mine, held jointly by **Richmont Mines** and **Louvem Mines**, following reconditioning work completed in the fall of 2001. A drill program is currently underway. After 13 years of operation, the Bousquet 2 mine (Au-Cu) held by **Barrick Gold** and located near Preissac, shut down on December 27, 2002 due to depletion of reserves.

In the Chibougamau area, the year 2002 was marked by several important events. Commercial production resumed at the Joe Mann mine, held by **Campbell Resources,** during the second quarter. Drill results appear to confirm preliminary estimates at the Joe Mann mine, where resources are estimated at 1.7 million tonnes at a grade of 11.18 g/t Au and 0.28 % Cu, of which 630,000 tonnes are classified as reserves at 9.84 g/t Au and 0.25 % Cu. The development of the Copper Rand 5000 (Au-Cu) project is progressing. The shaft deepening process has been completed and work on the decline began in the fall of 2002. Campbell Resources expects to reach the ore during the first quarter of 2003 and begin commercial production towards the end of 2003.

In 2002, several companies invested in numerous exploration projects in the search for polymetallic deposits. These companies were active mainly in the Rouyn-Noranda mining camp, in the Témiscamingue region, in an area east of Val-d'Or, and in the Chibougamau mining camp. The number of projects targeting polymetallic deposits in 2002 stood at 97 (Table 1C-2). Compared to the 118 projects reported in 2001, this represents a sharp drop of 18 %. These exploration projects required investments of more than $22.8 million. This amount is similar to the 2001 figure of $16.8 million (*Report on Mineral Exploration Activities in Québec 2001*), considering the latter did not include amounts invested for the feasibility study performed on the Lac Doré vanadium project, nor exploration expenses at the LaRonde mine. The lower number of base metal projects in 2002 relative to 2001 may be explained by slumping zinc prices, by the diamond exploration frenzy taking place in other parts of Québec, and by the steady rise in gold prices, especially towards the end of the year. Four regional projects, headed by **Majescor** (project P94), by partners **Noranda Inc.**, **Virginia Gold Mines**, and **Novicourt** (project P93), by **International Taurus Resources Inc.** and **Mano River Resources** (project P91), and by **Tango Mineral Resources Inc**. in partnership with **Explorateurs Innovateurs** (project P92) covered vast surface areas and/or many properties. These projects are tabled in only one region, despite the fact they often straddle more than one area.

We have compiled a total of 189 exploration projects in the Abitibi and Pontiac subprovinces in 2002, whereas 180 were reported in 2001. This is a slight increase of 5 %. In 2002, about $46.34 million were invested in exploration, for an increase of $18.44 million compared to the $27.9 million invested in 2001. In the Abitibi and Pontiac subprovinces, 399,750 m were drilled during the year 2002.

In 2002, as part of the Québec Mineral Exploration Assistance Program, 13 grassroots prospecting projects (component A1) received nearly $60,732 in financial assistance, and 39 advanced prospecting projects (component A2) received nearly $492,428. Fourteen exploration projects conducted by companies (component B) received $579,360. Seven advanced exploration projects (component D2) received $3,729,545 in financial assistance, and two deep drilling projects (component D1) shared a total of $313,195.

In the following sections, we will discuss the geological settings and the most significant results from gold and polymetallic exploration projects. Project locations in the Abitibi and Pontiac subprovinces are shown in figures 1C-1 to 1C-4.

Exploration for Precious Metal Deposits

CASA BERARDI – JOUTEL – MATAGAMI AREA (FIGURE 1C-1)

This area forms the northwestern segment of the Abitibi Subprovince. Three major E-W faults, namely the Detour, Casa Berardi, and Douay-Cameron faults, transect the region. Four gold deposits are known in the area: Casa Berardi, Douay, Vezza, and Agnico-Eagle–Telbel. Three of these (Casa Berardi, Douay, and Vezza) are hosted in the tholeiitic to calc-alkalic, volcano-sedimentary assemblage of the Taïbi Group, and are associated with the Casa Berardi and Douay-Cameron faults. The stratabound Agnico-Eagle–Telbel gold deposit lies along the border of the Joutel felsic complex and is associated with the Harricana fault.

Five projects were undertaken in this sector, for a total investment of $3.16 million. The Casa Berardi project (project 23) is located 130 km west-southwest of Matagami, within the Taïbi Group of sedimentary rocks. A feasibility study commissioned by **Aurizon Mines** indicates that the West Mine contains 6,943,000 tonnes of reserves at a grade of 6.7 g/t Au, for a total of 1,492,500 ounces (51,113 kg) of gold. An extensive drill program was carried out to test the extensions of zones 113, 118, and 120. Gold intersections include a 10.9-m interval grading 7.0 g/t Au in drillhole S63, in zone 120. In December, **Aurizon Mines** announced a $17-million underground exploration program targeting zone 113, which will take place over the next 19 months and will include a bulk sampling program.

The Gemini-Turgeon property (project 89) held by **Cancor Mines** is located 14 km south of the Casa Berardi project. A 5-hole drill program totalling 1,590 m was conducted to test targets delineated during a MEGATEM airborne survey conducted in January 2002. Drillhole 02-51 intersected gold mineralization grading 9.46 g/t Au over 6.0 m. The Fenelon project (project 36) by **International Taurus Resources** and **Fairstar Explorations** is located along the regional extension of the former Detour mine in northeastern Ontario. The deposit consists of a series of eight high-grade gold veins, in which the gold is erratically distributed. These veins occur in a subvertical gabbro intrusion within a sedimentary sequence. During the year 2001, the partners extracted a 14,000-tonne bulk sample from an open pit. The sample was processed at the Camflo mill in Malartic, and 4,213.2 ounces of gold (144.29 kg) were recovered. During the summer of 2002, a stripping program was conducted to expose the deposit and extract another large bulk sample.

LEBEL-SUR-QUÉVILLON - DESMARAISVILLE AREA (FIGURE 1C-1)

In this area, 11 gold exploration projects totalling $4.74 million in expenditures were carried out. This area is located in the north-central part of the Abitibi Subprovince. It contains several high-potential sectors, which remain practically unexplored. The Sleeping Giant mine (project 84), located 70 km west of Lebel-sur-Quévillon, has been in production for thirteen years and is held jointly by **Cambior** and **Aurizon Mines**. This is a lode gold deposit, characterized by high-grade gold ore. In 2002, a drill program totalling 68,362 m successfully delineated the depth extension of Zone 8 at the mine. Gold-rich intersections were encountered, such as 27 g/t Au over a true thickness of 1.8 m in drillhole 48-420. The drill program also identified promising, new, gold-bearing structures on level 785.

On the Comtois property (project 25), located 15 km northwest of Lebel-sur-Quévillon, **Maude Lake Exploration** conducted a drill program totalling 1,822 m. Several drillholes yielded interesting intersections, including 7.6 g/t Au over 3.0 m in drillhole Com-02-87, carried out in the Bell zone. Inferred resources for the Osborne and Bell deposits are estimated at 808,000 tonnes at an average cut grade of 9.6 g/t Au. The average horizontal thickness is 3.7 m. **Normabec Mining Resources** and **SOQUEM Inc**. carried out a trenching program to investigate a gold zone on the Verneuil property (project 81), located 28 km east of Lebel-sur-Quévillon. Out of 21 grab samples, 10 yielded grades of more than 1 g/t Au, including 6 assays between 5 and 90 g/t Au.

Strateco Resources and **Geonova Explorations**, a subsidiary of **Campbell Resources**, announced the results of 4 drillholes completed on the Discovery project (project 19), located 35 km north of Lebel-sur-Quévillon. The Discovery gold zone contains an estimated resource of 2.12 million tonnes at a grade of 5.11 g/t Au. Several gold zones were encountered in drillhole BD-02-67A. It intersected the East lens and yielded a grade of 12.84 g/t Au over 8.85 m. A 10,000-m drill program is scheduled to start in January 2003. On the Lac Shortt project (project 42), located 90 km west of Chapais, near the town of Desmaraisville, **Northern Mining Explorations** and **SOQUEM Inc**. conducted a 4-hole drill program totalling 943 m. Drillhole BV 02-58 intersected a syenite with local hematite, calcite, and silica alteration, which hosts a system of microfractures with disseminated pyrite. This drillhole encountered 133 m at a grade of 0.13 g/t Au, which also includes a 13.5-m interval at 0.48 g/t Au.

During the second quarter, commercial production resumed at the Joe Mann mine (project 88), operated by **Campbell Resources**. Drill results appear to confirm preliminary estimates concerning the Joe Mann mine, where mineral resources are estimated at 1.7 million tonnes at a grade of 11.18 g/t Au and 0.28 % Cu, of which 630,000 tonnes are classified as reserves at 9.84 g/t Au and 0.25 % Cu.

CHIBOUGAMAU AREA (FIGURE 1C-1)

The Chibougamau area is characterized by two mafic-felsic volcanic cycles (Roy Group) overlain by a sedimentary assemblage (Opemisca Group). Several mafic intrusions occur in the Roy Group (Lac Doré Complex, Cummings Complex, and Opawica Complex), whereas multi-phase synvolcanic granitoid intrusions such as the Chibougamau pluton occur in the core of anticlines. Two types of deposits are common in this area: a) massive sulphide veins with copper and gold mineralization, occurring in NW-SE shear zones within the anorthositic Lac Doré Complex, and b) porphyry-type copper-gold mineralization associated with breccias within the Chibougamau pluton. In 2002, nine gold exploration projects were reported in the Chapais-Chibougamau area.

The year 2002 was marked by the development of the Copper Rand 5000 project, which contains measured and indicated resources of 1.9 million tonnes at 1.55 % Cu and 3.33 g/t Au. Development work is progressing: the deepening of shaft no. 4 has been completed, and work on the decline was undertaken in the fall of 2002. **Campbell Resources** expects to reach the ore during the first quarter of 2003 and begin commercial production towards the end of 2003.

NORMÉTAL – LA SARRE – AMOS AREA (FIGURE 1C-1)

Located in the west-central part of the Abitibi Subprovince, the vast area around Normétal – La Sarre – Amos contains a variety of geological settings. Felsic bands occur in a discontinuous fashion throughout the area, and regional deformation corridors are also present. Three projects, with exploration expenditures totalling $73,000, are reported in this sector.

ROUYN-NORANDA – CADILLAC AREA (FIGURES 1C-1 AND 1C-3)

The Rouyn-Noranda central volcanic complex (Blake River Group), which characterizes this area, comprises five mafic-felsic volcanic cycles and associated synvolcanic intrusions. Numerous copper-zinc VMS deposits and lode gold deposits were mined in the area over the past century. At the eastern end of the area lies the Bousquet mining camp, undoubtedly the most important gold camp in the province. It hosts lode gold and polymetallic (Au-Cu and Au-Cu-Zn-Ag), gold-rich, VMS deposits.

With 25 projects in 2002, the Rouyn-Noranda – Cadillac area remained very active during the year. These projects required investments of about $8.54 million. Four gold mines were in operation in 2002: Bousquet 2, Donald-J.LaRonde, Mouska, and Doyon.

The Francoeur mine, held by **Richmont Mines** (project 7) and located 20 km west of Rouyn-Noranda, ceased operations at the end of November 2001. Following the acquisition of the adjacent Norex property (project 8), exploration work included the development of a 214-m access ramp in the East Area of the Francoeur mine and a drill program. In the East Area, 11 drillholes totalling 3,106 m were completed. In the West Area, 7 drillholes totalling 3,807 m were completed, some of which yielded gold-rich intervals, such as 8.6 g/t Au over 1.1 m in drillhole R-867.

At the Doyon mine, operated by **Cambior** (project 86), an extensive surface and underground exploration program and a definition drilling campaign involving about 50,000 m of drilling were carried out in 2002. Exploration drilling totalling 15,000 m was conducted between levels 10 and 14, to confirm the extension of ore zones F, M, and Y. A new gold vein system, Zone J, was identified 125 m to the east of the mine infrastructure. One of the drillholes that intersected this zone, R11871-02, yielded grades of 10.9 g/t Au over 3.0 m. After 13 years of production, the Bousquet 2 mine (Au-Cu), operated by **Barrick Gold** and located near Preissac, ceased operations on December 27, 2002 due to depletion of reserves.

On the Lapa property (project 21), located 16 km west of Malartic, **Agnico-Eagle Mines** and **Breakwater Resources** carried out a 7-hole drill program totalling 5,419 m to test the Contact Zone, located between volcanic rocks of the Piché Group and sediments of the Cadillac Group. The results included 10.97 g/t Au over a true thickness of 4.54 m in drillhole 118-02-02B.

Thundermin Resources, **SOQUEM Inc**., and **Ressources Itaminéraque** (project 73) completed 7 drillholes totalling 1,519 m on the Lac Pelletier property. The results included 8.23 g/t Au over 3.0 m in drillhole 1298-02-06. On the Durbar zone on the Astoria property near Rouyn-Noranda, **Yorbeau Resources** (project 83) carried out stripping and a 14-hole drill program totalling 821 m. Channel samples yielded grades reaching 50.05 g/t Au over 0.40 m. Discontinuous gold-bearing veins were encountered in drillhole 02, with 4.1 g/t Au over 2.3 m.

Two exploration programs along the Destor-Porcupine fault yielded significant results. **Cambior** and **Cogema Resources** (project 47) carried out a 9-hole drill campaign on the Nemrod East zone, Porcupine project. Drillhole POR02-118 intersected quartz-carbonate-pyrite veins which yielded grades of 9.6 g/t Au over 1.45 m. **Globex Mining Enterprises** and **Kinross Gold Corporation** (project 35) conducted a 14-hole exploration program on the Duquesne West property. Drillhole DQ-02-02, testing the extension of the Shaft gold zone, intersected an intensely altered ankerite-pyrite zone which graded 6.86 g/t Au over 11.15 m.

MALARTIC - SENNETERRE - VAL-D'OR AREA (FIGURES 1C-1 AND 1C-4)

The Malartic – Senneterre – Val-d'Or area forms the southeastern part of the Abitibi Subprovince. The Cadillac-Larder Lake Break separates Abitibi rocks from the Pontiac Subprovince to the south. Felsic to ultramafic volcanic rocks are present, as well as a wide range of intrusive rocks. The Barraute area is characterized by regional deformation zones (Jolin, Uniacke), and is known mainly for its zinc-silver veins. A total of 32 projects were active in the Malartic – Senneterre – Val-d'Or area. Exploration expenses totalled $6.01 million.

In the Val-d'Or mining camp, **McWatters Mining** continued development work at the Sigma-Lamaque complex to bring the deposit into production. This work included overburden and waste removal from the open pit mine and expansion of the milling capacity from 3,000 to 5,000 tonnes per day. Commercial production is slated to begin in early 2003. Proven and probable reserves at the Sigma-Lamaque complex stand at 10,297,870 metric tonnes at a grade of 2.67 g/t Au. Underground drilling totalling 5,012 m in 38 drillholes was carried out at the Kiena mine, shut down in September, to test exploration targets in the hanging wall of the mine. The drillholes delineated two new gold zones, P and R, along a subhorizontal mineralized corridor. These zones contain an estimated resource of 1,178,700 metric tonnes at 4.25 g/t Au.

Production gradually resumed in January at the Beaufor mine (project 85), jointly held by **Richmont Mines** and **Louvem Mines**, following reconditioning work completed in the fall of 2001. The mine contains proven and probable reserves of 1,025,130 metric tonnes at a grade of 7.19 g/t Au. Drillholes identified additional reserves and confirmed the extension of the main ore zones at the mine. At depth, drillhole 74-01 intersected grades of 13 g/t Au over 3.0 m true thickness, more than 45 m below the lowest level (610 m) of the mine. On the Croinor property (project 69), located 70 km east of Val-d'Or, **South-Malartic Exploration** obtained interesting drill results, such as 6.22 g/t Au over 1.5 m in drillhole CR-02-04. A total resource of 7.1 million tonnes at a grade of 2.3 g/t Au has been established for the deposit.

Atlantis Exploration (project 77) conducted an exploration program, including 11 drillholes for a total of 3,500 m, to define the Hamelin zone on their Abitibi property, located near Val-d'Or. The drillholes intersected mineralization between 150 and 300 m depth. Interesting results included 15.04 g/t Au over 0.60 m in drillhole AB-2002-07. **Western Quebec Mines** (project 32) completed 11 drillholes totalling 1,248 m to test zone 22 on the Shawkey property, located near Val-d'Or. Results included 14.9 g/t Au over 0.20 m in drillhole 141-127.

TÉMISCAMINGUE AREA (FIGURE 1C-1)

In the Pontiac Subprovince, located in the Témiscamingue region, 7 gold exploration projects requiring $132,595 in expenditures were undertaken.

Exploration for Polymetallic Deposits

CASA BERARDI – JOUTEL – MATAGAMI AREA (FIGURE 1C-2)

The Casa Berardi – Joutel – Matagami area is known for its zinc-rich deposits. Two mines are currently in operation in this area : the Selbaie mine operated by Billiton Metals Canada and the Bell Allard mine operated by Noranda Inc. However, this vast area remains very difficult to explore given the thickness of overburden, which exceeds 50 m in certain sectors.

In 2002, 15 exploration projects for polymetallic deposits were undertaken in the Casa Berardi – Joutel – Matagami area, requiring a total investment of a little over $3.4 million. **SOQUEM Inc.**, on its own or in partnership with other companies, owns several properties north of Joutel, whereas **Noranda Inc.** remains the dominant player in the Matagami mining camp. The announcement of a discovery of kimberlite indicator minerals in glacially derived sediments west of Matagami in May 2002 by **GlobeStar Mining Corporation** (formerly **TGW Corporation Inc.**) opened up this vast area to diamond exploration.

Noranda Inc. and the **Société de développement de la Baie James** (SDBJ) completed their exploration program on the Perseverance property (project P33). However, **Noranda Inc.** announced in December 2002 that it would postpone to 2005-2006 development of the orebody, located a few kilometres from Matagami, mainly due to depressed zinc prices. The Perseverance deposit comprises three massive sulphide lenses, Equinox, Perseverance, and Perseverance West, which contain a total resource of 5 million tonnes at a grade of 16.8 % Zn, 1.3 % Cu, 34 g/t Ag, and 0.4 g/t Au. **Noranda Inc.** is also continuing exploration at the Bell Allard mine (project P40) and on several properties located along the Key Tuffite, the favourable horizon hosting massive sulphide deposits in the Matagami mining camp. **SOQUEM Inc.** conducted drill programs on the Samson property (project P87) and, in partnership with **BHP-Billiton**, on the Brouillan project (project P26). During the year, **Majescor** (project P94) and partners **International Taurus Resources Inc.** and **Mano River Resources Inc.** (project P91) undertook till surveys to find kimberlite indicator minerals over vast areas in this part of the Abitibi Subprovince.

LEBEL-SUR-QUÉVILLON – DESMARAISVILLE AREA (FIGURE 1C-2)

Seven exploration projects for base metals were carried out in the central part of the Abitibi Subprovince. These projects required investments exceeding $212,000.

In Grevet and Mountain townships, **Breakwater Resources** carried out underground exploration at the Langlois mine, in Zone 97 (project P80). A feasibility study was completed in August 2001 with the objective of resuming mining operations, which had been interrupted in November 2000. **SOQUEM Inc.** explored for platinum group elements (PGE) east of Desmaraisville (projects P58 and P44), in partnership with **Metco Resources Inc.** Prospector **Michel Proulx** identified 12 new rare earth element (REE) showings on his Lanthanide extension project (project P43) in Grevet Township. A total of 16 showings, with grades ranging from 0.24 to 5.74 % REEOx (oxides of La+Ce+Pr+Nd+Sm), have been discovered on the property. This mineralization is associated with the alkalic Grevet Complex.

CHIBOUGAMAU AREA (FIGURE 1C-2)

In 2002, six exploration projects for polymetallic deposits were carried out in the eastern segment of the Abitibi Subprovince, generating investments of $697,000. **McKenzie Bay Resources** conducted a feasibility study of the Lac Doré vanadium deposit (project P95), located southeast of Chibougamau. The company announced positive results in late April. The ore deposit reportedly contains a measured resource of 32 million tonnes at 0.65 % V_2O_5 and an indicated resource of 68 million tonnes at 0.49 % V_2O_5. In December, the company announced the construction of a pilot plant in 2003 to produce high-purity vanadium pentoxide (V_2O_5). **SOQUEM Inc.** has an option to acquire a 20 % interest in the project.

Partners **Inmet Mining Corporation** and **Loubel Exploration Inc**. completed 12 drillholes on the Lemoine property (project P61). The drillholes were collared to test targets located along the stratigraphic horizon that hosts the former Lemoine mine, which produced 758,070 tonnes of ore at 4.2 % Cu, 9.6 % Zn, 4.2 g/t Au, and 83.4 g/t Ag between 1975 and 1983. **SOQUEM Inc.** explored for PGEs in areas to the south and west of Chibougamau in association with **Metco Resources Inc**. (projects P57 and P85), and on the Michwacho property in a joint venture project with **Nimsken Corporation Inc**. (project P82).

NORMÉTAL – LA SARRE – AMOS AREA (FIGURE 1C-2)

In the Normétal – La Sarre – Amos area, 10 exploration projects for polymetallic deposits were undertaken, for a total investment of more than $575,000. **Teck Cominco Ltd.**, in partnership with **Northern Crown Mines** and **Wheaton River Minerals Ltd.**, conducted an extensive exploration program in Guyenne and Berry townships, northwest of Amos (project P48). The three companies, in association with **Barrick Gold** and **Kinross Gold Corporation**, also worked on the Chicobi Sud project, located in the same sector (project P49).

ROUYN-NORANDA – CADILLAC AREA (FIGURES 1C-2 AND 1C- 3)

Ten exploration projects for polymetallic deposits were conducted during the year 2002 in the Rouyn-Noranda mining camp and the Cadillac area. These required investments of more than $14.1 million. A large portion of this amount was invested in a regional MEGATEM airborne survey commissioned by **Noranda Inc**. and its partners, as well as in exploration near producing polymetallic mines in the area, namely the LaRonde and Bouchard-Hébert mines.

Agnico-Eagle Mines continued investigating zones 20 North and 20 South at the LaRonde mine (project P28), located west of Cadillac. An exploration program was conducted to test the depth and western extensions of Zone 20 North. In April, drillhole 3215-21B intersected 26.65 m at 8.23 g/t Au, at a depth of 2,785 m. This intersection is the highest grade section obtained at depth to date, and appears to support indications that the ore zone thickens at depth. The company launched a study to evaluate the economic potential of this very deep ore zone. It also reported that the mine and processing plant reached a production rate of 7,000 tonnes of ore per day during the fourth quarter. The exploration program also provided evidence for a new parallel ore zone in the footwall. **Agnico-Eagle Mines** conducted a large-scale exploration program from the surface and the 20th level exploration drift at the LaRonde mine, to investigate the El Coco property, adjacent to the LaRonde mine. **Breakwater Resources** launched a large drill program and a geophysical survey in the vicinity of the Bouchard-Hébert mine (project P37), in order to identify new massive sulphide lenses. **Noranda Inc**., in partnership with **Virginia Gold Mines** and **Novicourt**, carried out a vast MEGATEM airborne survey covering the Rouyn-Noranda mining camp (project P93). The company reported encouraging results and is currently conducting ground checks of detected anomalies.

MALARTIC – SENNETERRE – VAL-D'OR AREA (FIGURES 1C-2 AND 1C-4)

With 37 projects in 2002, the Val-d'Or mining camp and the Malartic and Senneterre areas remained very active in the search for polymetallic deposits. These projects required a little over $2.57 million in expenditures. A large portion of this amount was invested in Bourlamaque and Louvicourt townships, east of Val-d'Or, where **Aur Resources** is hoping to locate new ore lenses near the Louvicourt mine. In 2002, the company, on its own or in joint venture projects with various companies, conducted 31 exploration projects centred on the Val-d'Or Formation. This work included MEGATEM and Titan surveys, as well as drillholes on a few properties. On the Dunraine project (project P78), held by **Aur Resources** in partnership with **Cambior**, a drill program yielded intersections of 0.30 % Zn over 28.0 m and 0.81 % Cu over 3.0 m. In Carpentier Township, **Sudbury Contact Mines Ltd**. identified an alteration zone with sericite+quartz+pyrophyllite+chloritoid on the Carpentier property (project P30). Prospectors **Robert Tremblay** and **Terence Coyle** discovered two PGE showings on the Fiedmont property, located in Fiedmont Township (project P39). Grab samples yielded grades of up to 2,099 ppb Pt+Pd in the Highway showing and up to 6,728 ppb Pt+Pd in the Tower showing.

TÉMISCAMINGUE AREA (FIGURE 1C-2)

Twelve exploration projects were carried out in the Pontiac Subprovince in 2002. Exploration expenditures totalling nearly $1.15 million were devoted to projects located mainly in the southwestern part of the subprovince, in the search for nickel, copper, and platinum group element mineralization.

Aurora Platinum Corporation continued its extensive exploration campaign, with prospecting work, geochemistry surveys, and drilling on its Geoffroy, Belleterre, Midrim, and Angliers properties (projects P2, P3, P4 and P5), located northeast of Ville-Marie. Known ore zones on these properties were confirmed and extended by drilling, and new ore zones were identified. Additional work is planned for 2003 on these properties. In the spring, partners **Loubel Exploration Inc**. and **Tom Exploration**

Inc. released the results of a drill program on the Kelly Lake property (project P10), located in Blondeau Township. Drillhole K2-117 intersected 14.8 m at 1.01 % Ni, 0.63 % Cu, 0.44 g/t Pt, and 0.49 g/t Pd, whereas a 12-m interval in drillhole K2-120 yielded grades of 1.02 % Ni, 0.34 % Cu, 0.48 g/t Pt, and 0.47 g/t Pd.

Opportunities for exploration

The Abitibi and Pontiac subprovinces still remain prime target areas for mineral exploration in Québec, despite nearly 100 years of exploration and mining success. Mineral exploration over the past century has focused mainly on traditional targets, namely lode gold and volcanogenic massive sulphide deposits. Over the past few years, a number of projects have been undertaken in the search for other substances, such as Ni-Cu-PGE deposits and diamonds.

PRECIOUS METALS

Other than the prolific gold camps of Bousquet and Val-d'Or, the tholeiitic to calc-alkalic, volcano-sedimentary assemblage of the Taïbi Group and its related Casa Berardi and Douay-Cameron faults remain first-class targets for the discovery of new gold deposits. Other large-scale, east-west, brittle structures such as the Cadillac-Larder Lake Break and the Destor-Porcupine fault, both extending for more than 100 km in Ontario and Québec, host some of the largest gold camps in eastern Canada. The Timmins mining camp in Ontario, which has produced 56 million ounces of gold to date, sits along the western extension of the Destor-Porcupine fault. The Holt-McDermott mine (Barrick Gold) and the Holloway mine (Newmont Canada Ltd and Teddy Bear Valley Mines Ltd) are located along the fault, on the Ontario side of the border. The Beattie-Donchester mining camp in Québec sits along the eastern extension of the Destor-Porcupine fault. Farther east, in Duparquet and Destor townships, a few gold deposits associated with the Destor-Porcupine fault and its subsidiaries (namely the Duquesne and Lépine faults) were mined in the past. Exploration work is underway on the Porcupine (Cambior and Cogema Resources Inc.) and Duquesne West (Globex Mining Enterprises Inc. and Kinross Gold Corporation) properties, and preliminary results released by these companies are very promising. Several former ore deposits, and more than 70 gold showings (> 1 g/t Au) are scattered along the Destor-Porcupine fault in this area. Subsidiary faults have not been extensively explored, and apart from a few segments (Beattie, Shaft, Patino), very little work has been conducted beyond 500 m depth.

In 2002, the Ministère des Ressources naturelles launched a project in the Duparquet mining camp (also known as Beattie-Donchester), aimed at developing new tools for gold exploration. This two-year project will include a regional metallogenic study and 3D modelling, which will complement regional mapping conducted in the early 1990s (Goutier, 1997; Goutier and Lacroix, 1992). The Destor-Porcupine fault and its subsidiaries farther east remain neglected in terms of exploration, and the potential for new discoveries along these major structures remains significant.

DIAMONDS

The Abitibi and Pontiac subprovinces contain the Témiscamingue and Desmaraisville kimberlite fields. In the Témiscamingue region, in the western part of the Pontiac Subprovince, 5 weakly diamondiferous kimberlite pipes, with diatreme and hypabyssal facies (Moorhead *et al.*, 1999), are known. Two of these were dated at 125 and 142 Ma. Kimberlite indicator minerals were identified in several locations along a N-S esker east of Témiscamingue Lake (Beaumier *et al.*, 1993a). These indicator minerals clearly suggest many dispersal sources in the sector, distinct from known kimberlites (Beaumier *et al.*, 1993b). Furthermore, a number of semi-circular (< 1 km diameter) aeromagnetic anomalies, both negative and positive, have yet to be drill-tested.

The Desmaraisville kimberlite field lies in the north-central part of the Abitibi Subprovince. It contains 5 very weakly diamondiferous hypabyssal kimberlite pipes (Moorhead *et al.*, 1999) and numerous dikes (Watson, 1955; Sharma and Lauzière, 1984; Bourne and Bossé, 1991), dated at 1100 Ma. This field is located along the Waswanipi-Saguenay structural corridor, oriented WNW at 286°, which marks the extension of the Saguenay rift all the way to the Ordovician carbonate basin near Waswanipi Lake in the Abitibi region (Moorhead *et al.*, 1999). Desmaraisville kimberlites are clustered in two sectors. The Le Tac Township sector hosts 3 pipes and numerous dikes located near NE-trending diabase dikes assigned to the Preissac swarm (2167-2214 Ma). The Ailly Township sector, located about 45 km to the northwest, hosts 2 pipes and a few dikes located near a major diabase dike belonging to the Abitibi swarm (1141 Ma). The dominant structural control for the Desmaraisville kimberlite field appears to be the WNW-trending Waswanipi-Saguenay corridor. However, NE-oriented faults and diabase dikes form second-order structural controls that determine the emplacement of individual pipes. The Desmaraisville field probably hosts additional kimberlite pipes and dikes.

The announcement last May by GlobeStar Mining Corp. (formerly TGW Corporation Inc.) of the discovery of kimberlite indicator minerals in glacially derived sediments west of Matagami opened up this vast area to diamond exploration. This zone lies about 120 km west of the Desmaraisville field, along the western segment of the Waswanipi-Saguenay corridor. The source of indicator minerals remains unknown at this time. If the structural controls for kimberlites in this zone are the same as in the Desmaraisville area, then kimberlites to the west of Matagami may also be located near NE-trending diabase dikes or faults.

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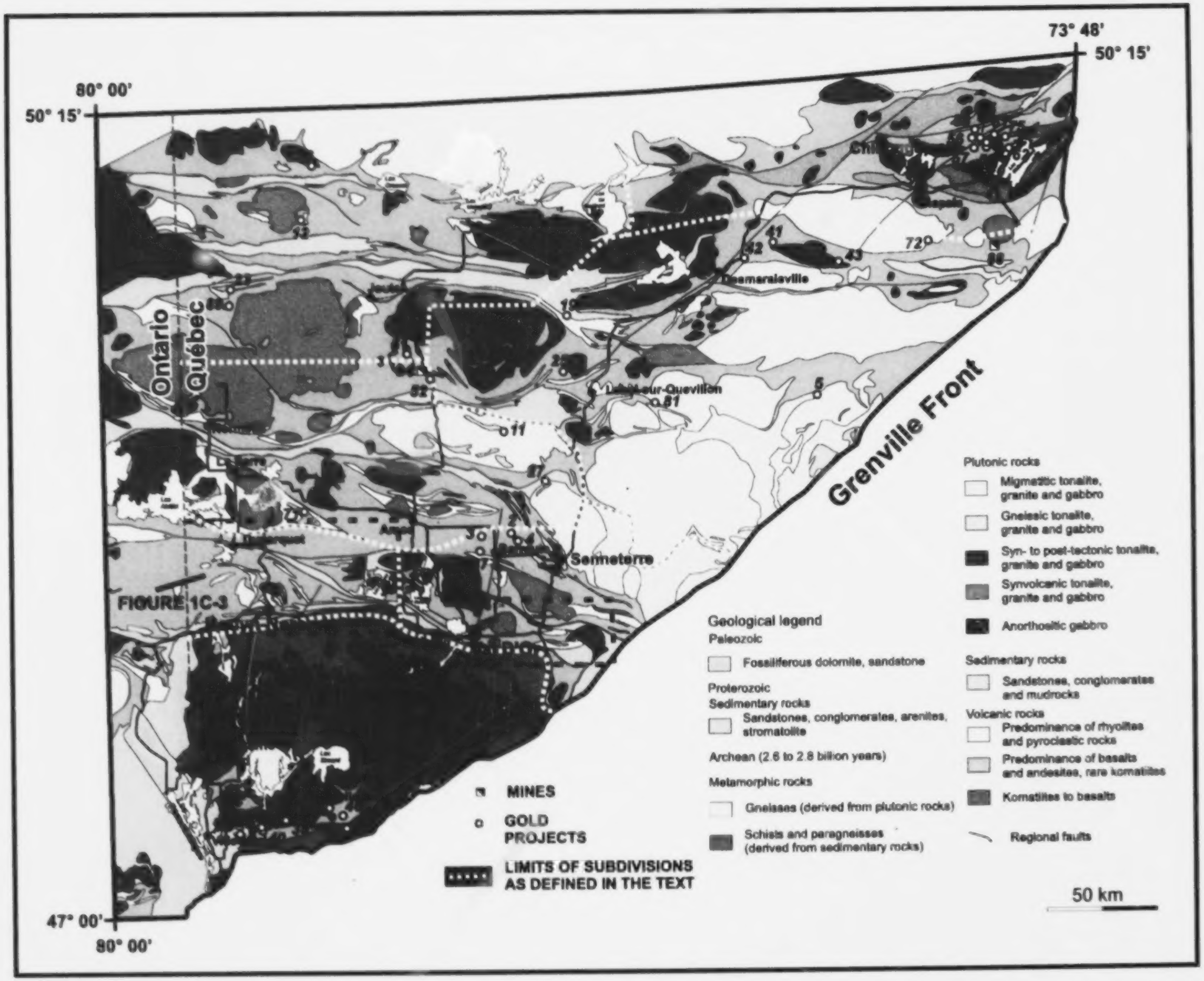
73° 48'
50° 15'
80° 00'
50° 15'
47° 00'
80° 00'
Ontario
Québec
Desmaraisville
Lebel-sur-Quévillon
Senneterre
Amos
Grenville Front
FIGURE 1C-3
MINES
GOLD PROJECTS
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT
Geological legend
Paleozoic
Fossiliferous dolomite, sandstone
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean (2.6 to 2.8 billion years)
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Schists and paragneisses (derived from sedimentary rocks)
Plutonic rocks
Migmatitic tonalite, granite and gabbro
Gneissic tonalite, granite and gabbro
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Anorthositic gabbro
Sedimentary rocks
Sandstones, conglomerates and mudrocks
Volcanic rocks
Predominance of rhyolites and pyroclastic rocks
Predominance of basalts and andesites, rare komatiites
Komatiites to basalts
Regional faults
50 km

Figure 1C-1. Location of exploration projects and gold operations in the Abitibi and Pontiac subprovinces for 2002. Modified geology from Hocq and Verpaelst (1994).

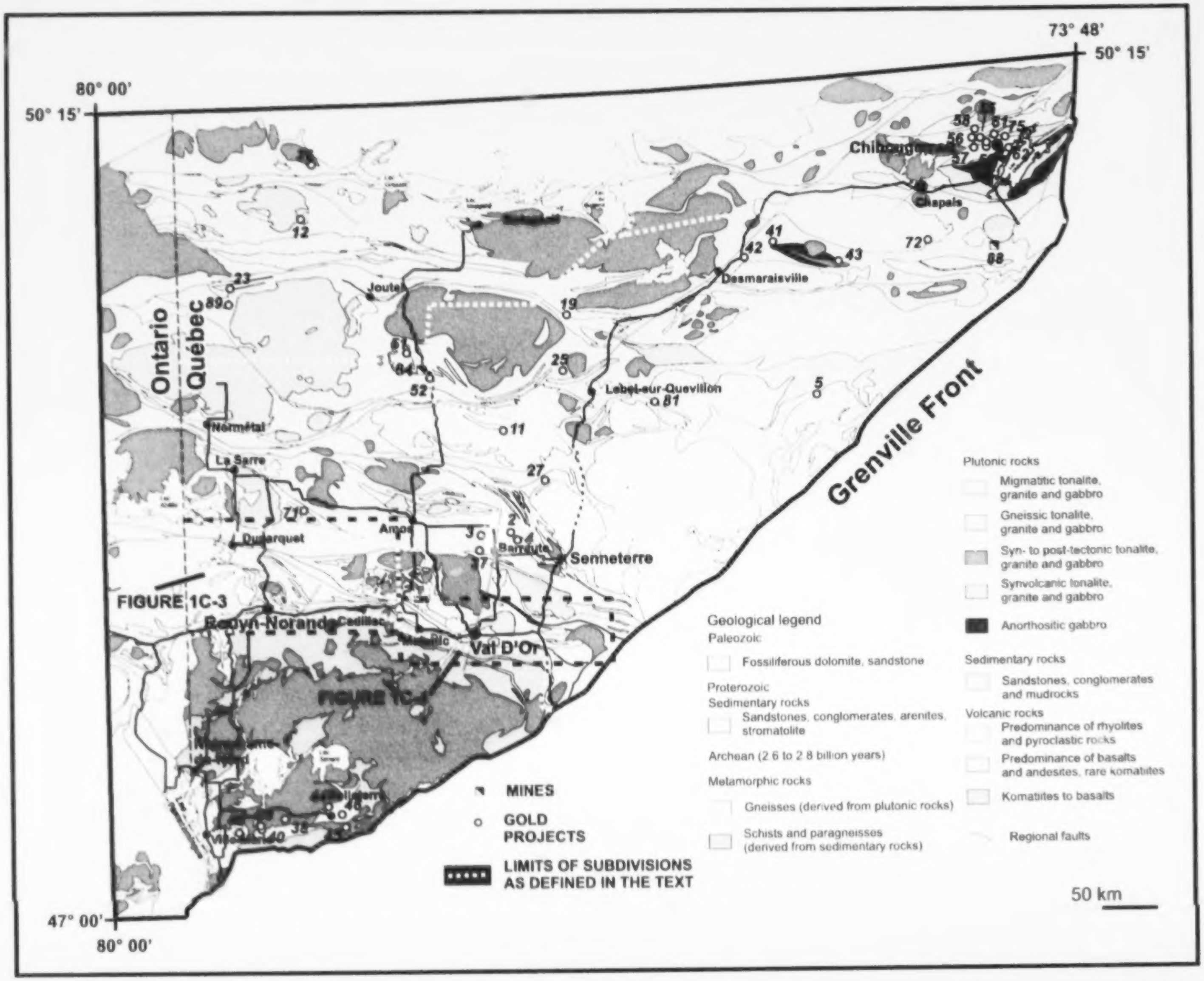
73° 48'
50° 15'
80° 00'
50° 15'
47° 00'
80° 00'
Ontario
Québec
Grenville Front
Chibougamau
Chapais
Desmaraisville
Joutel
Lebel-sur-Quévillon
Normétal
La Sarre
Amos
Dupuy
Barraute
Senneterre
Rouyn-Noranda
Cadillac
Val D'Or
FIGURE 1C-3
FIGURE 1C-4
MINES
GOLD PROJECTS
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT
Geological legend
Paleozoic
Fossiliferous dolomite, sandstone
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean (2.6 to 2.8 billion years)
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Schists and paragneisses (derived from sedimentary rocks)
Plutonic rocks
Migmatitic tonalite, granite and gabbro
Gneissic tonalite, granite and gabbro
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Anorthositic gabbro
Sedimentary rocks
Sandstones, conglomerates and mudrocks
Volcanic rocks
Predominance of rhyolites and pyroclastic rocks
Predominance of basalts and andesites, rare komatiites
Komatiites to basalts
Regional faults
50 km

Figure 1C-1. Location of exploration projects and gold operations in the Abitibi and Pontiac subprovinces for 2002. Modified geology from Hocq and Verpaelst (1994).

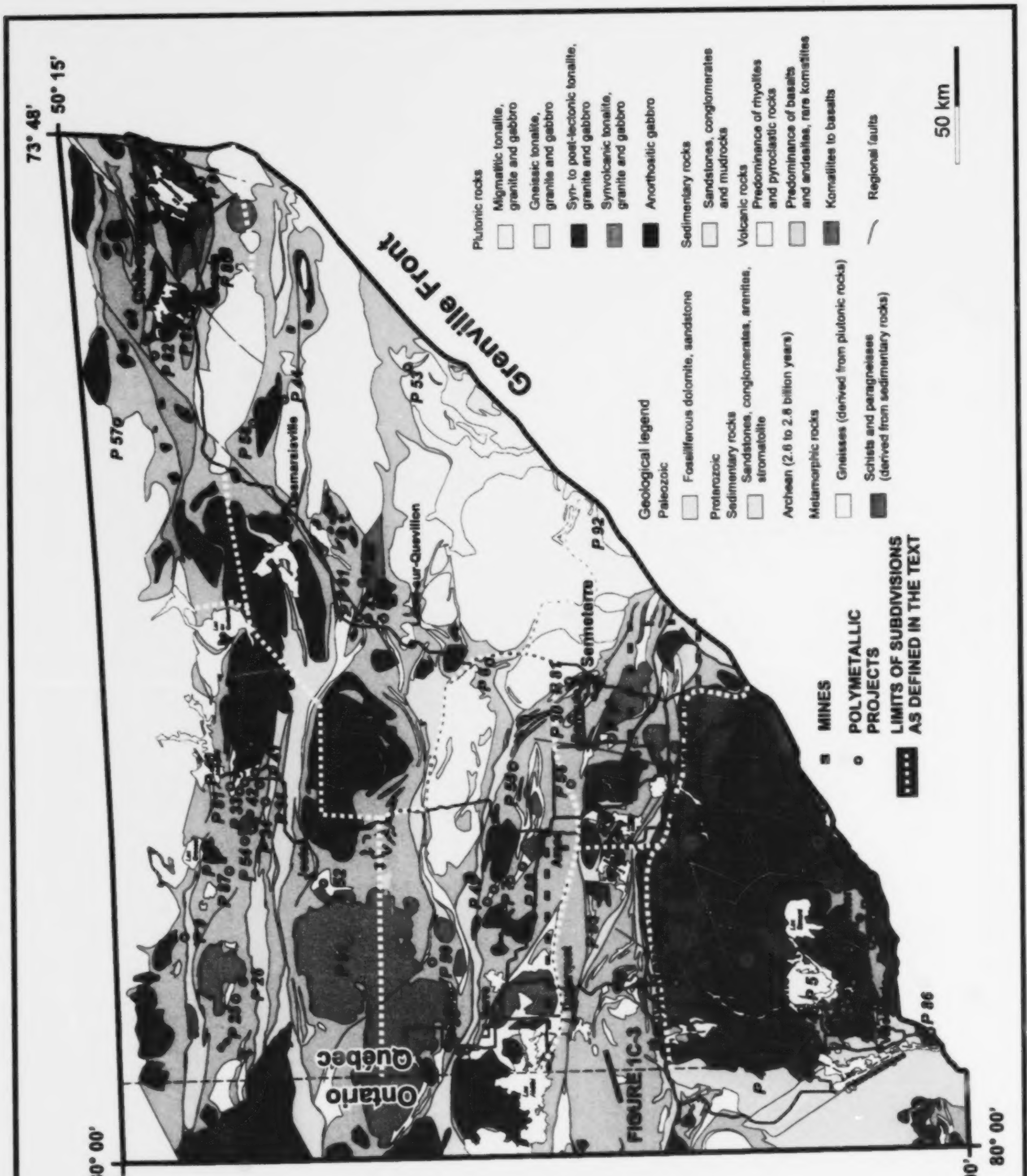
50° 15'
80° 00'
73° 48'
50° 15'
47° 00'
80° 00'
Grenville Front
Ontario
Québec
FIGURE 1C-3
Senneterre
Lebel-sur-Quévillon
Desmaraisville
P 57
P 53
P 92
P 86
MINES
POLYMETALLIC PROJECTS
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT
Geological legend
Paleozoic
Fossiliferous dolomite, sandstone
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean (2.6 to 2.8 billion years)
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Schists and paragneisses (derived from sedimentary rocks)
Plutonic rocks
Migmatitic tonalite, granite and gabbro
Gneissic tonalite, granite and gabbro
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Anorthositic gabbro
Sedimentary rocks
Sandstones, conglomerates and mudrocks
Volcanic rocks
Predominance of rhyolites and pyroclastic rocks
Predominance of basalts and andesites, rare komatiites
Komatiites to basalts
Regional faults
50 km

Figure 1C-2. Location of exploration projects and polymetallic operations in the Abitibi and Pontiac subprovinces in 2002. Modified geology from Hocq and Verpaelst (1994).

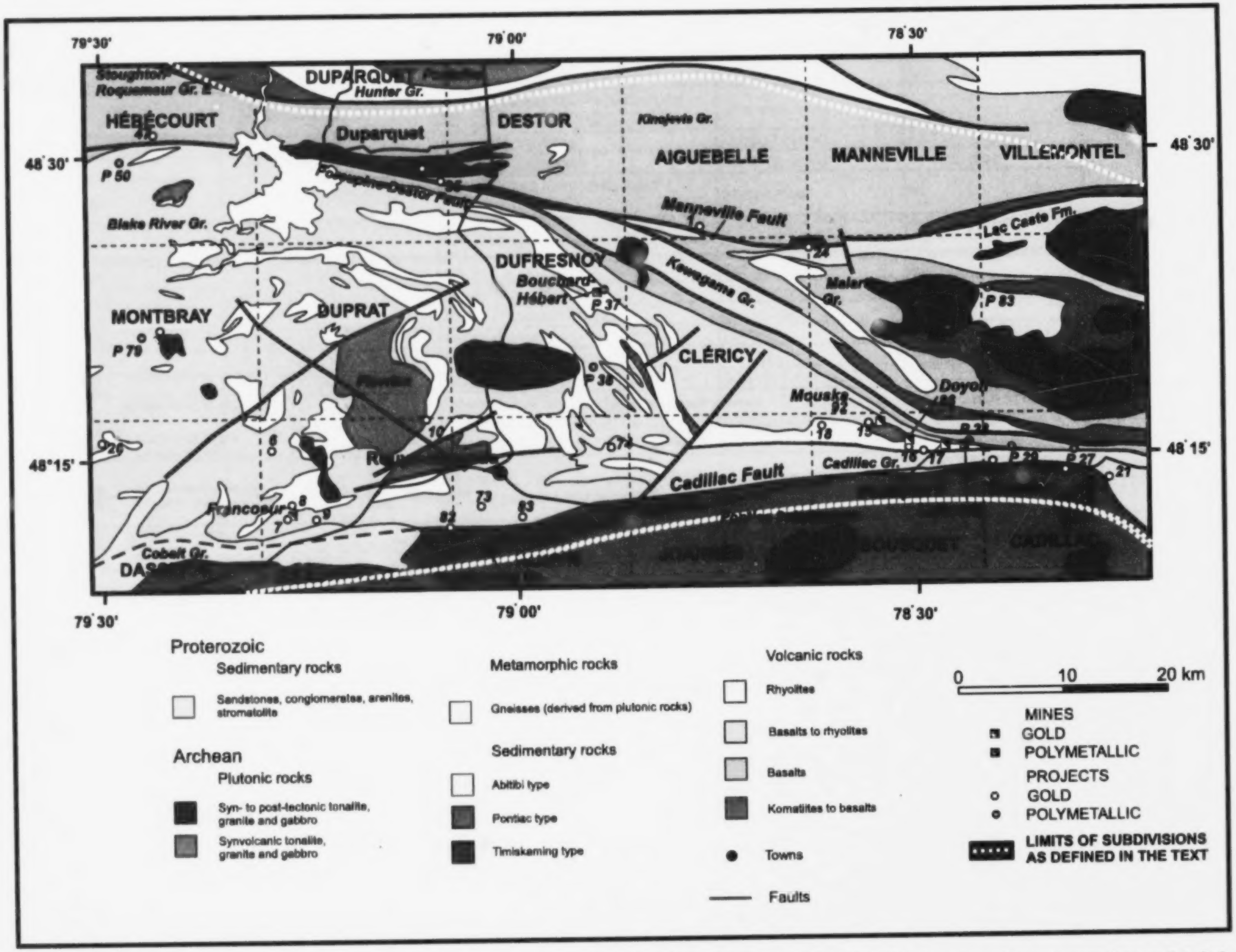
79°30'
79°00'
78°30'
48°30'
48°15'
Stoughton-Roquemaur Gr.
DUPARQUET
Hunter Gr.
HÉBÉCOURT
Duparquet
DESTOR
Kinojevis Gr.
AIGUEBELLE
MANNEVILLE
VILLEMONTEL
P 50
Porcupine-Destor Fault
Blake River Gr.
Manneville Fault
Lac Caste Fm.
DUFRESNOY
Bouchard-Hébert
P 37
Kewagama Gr.
Malartic Gr.
P 83
MONTBRAY
P 79
DUPRAT
CLÉRICY
P 38
Mouska
Doyon
Cadillac Fault
Cadillac Gr.
Francoeur
Cobalt Gr.
P 29
P 27
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean
Plutonic rocks
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Sedimentary rocks
Abitibi type
Pontiac type
Timiskaming type
Volcanic rocks
Rhyolites
Basalts to rhyolites
Basalts
Komatiites to basalts
Towns
Faults
0
10
20 km
MINES
GOLD
POLYMETALLIC
PROJECTS
GOLD
POLYMETALLIC
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT

Figure 1C-3. Location of exploration projects and mines in the Rouyn-Noranda - Cadillac area in 2002. Modified geology from Avramtchev and Lebel-Drolet (1981) and Couture (1991).

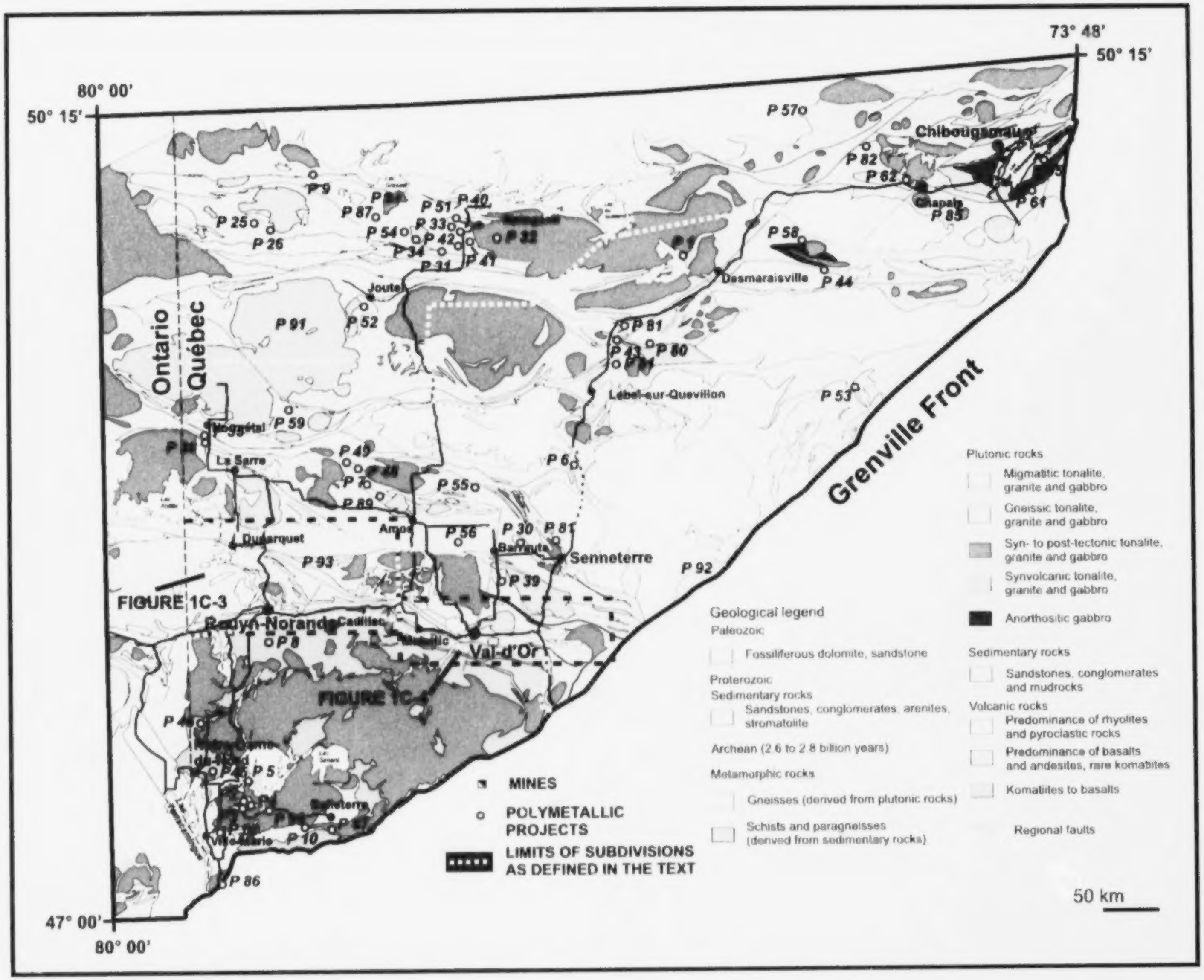
80° 00'
50° 15'
73° 48'
50° 15'
47° 00'
80° 00'
Ontario
Québec
Grenville Front
Chibougamau
Chapais
Desmaraisville
Lebel-sur-Quevillon
Joutel
Normétal
La Sarre
Dupuy
Dupuy
Amos
Barraute
Senneterre
Rouyn-Noranda
Cadillac
Malartic
Val-d'Or
Belleterre
Ville-Marie
FIGURE 1C-3
FIGURE 1C-4
P 9
P 25
P 26
P 87
P 51
P 40
P 33
P 54
P 42
P 34
P 31
P 41
P 32
P 57
P 82
P 62
P 85
P 61
P 58
P 44
P 91
P 52
P 81
P 43
P 80
P 53
P 59
P 49
P 7
P 89
P 55
P 6
P 56
P 30
P 81
P 93
P 39
P 92
P 8
P 5
P 10
P 86
MINES
POLYMETALLIC PROJECTS
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT
Geological legend
Paleozoic
Fossiliferous dolomite, sandstone
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean (2.6 to 2.8 billion years)
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Schists and paragneisses (derived from sedimentary rocks)
Plutonic rocks
Migmatitic tonalite, granite and gabbro
Gneissic tonalite, granite and gabbro
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Anorthositic gabbro
Sedimentary rocks
Sandstones, conglomerates and mudrocks
Volcanic rocks
Predominance of rhyolites and pyroclastic rocks
Predominance of basalts and andesites, rare komatiites
Komatiites to basalts
Regional faults
50 km

Figure 1C-2. Location of exploration projects and polymetallic operations in the Abitibi and Pontiac subprovinces in 2002. Modified geology from Hocq and Verpaelst (1994)

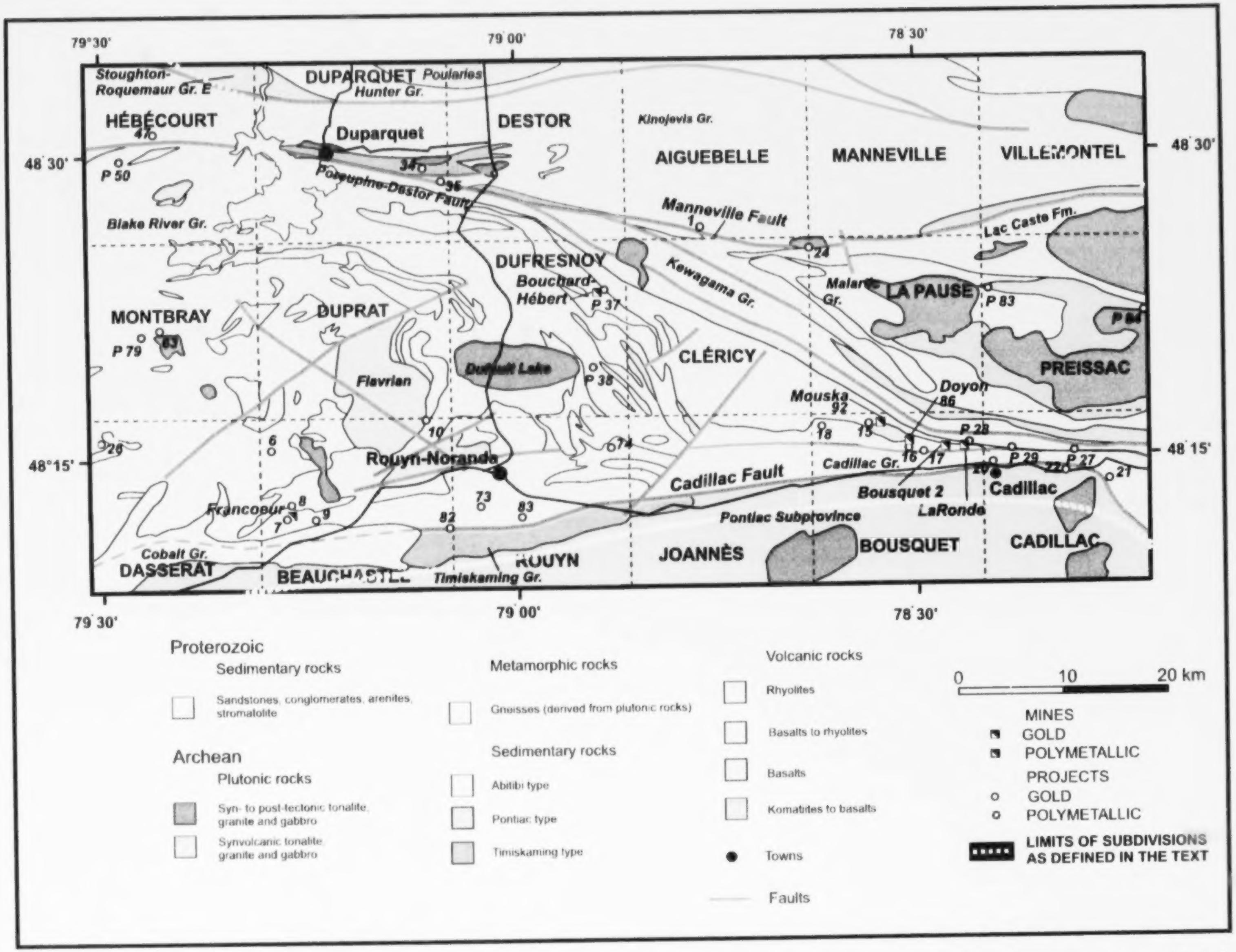
79°30'
79°00'
78°30'
48°30'
48°15'
Stoughton-Roquemaur Gr. E
DUPARQUET
Poularies
Hunter Gr.
HÉBÉCOURT
Duparquet
DESTOR
Kinojevis Gr.
AIGUEBELLE
MANNEVILLE
VILLEMONTEL
Porcupine-Destor Fault
Blake River Gr.
Manneville Fault
Lac Caste Fm.
DUFRESNOY
Kewagama Gr.
Malartic Gr.
LA PAUSE
Bouchard-Hébert
MONTBRAY
DUPRAT
Dufault Lake
CLÉRICY
PREISSAC
Flavrian
Mouska
Doyon
Rouyn-Noranda
Cadillac Gr.
Cadillac Fault
Bousquet 2
Cadillac
LaRonde
Pontiac Subprovince
Francoeur
Cobalt Gr.
DASSERAT
BEAUCHASTEL
Timiskaming Gr.
ROUYN
JOANNÈS
BOUSQUET
CADILLAC
47
P 50
34
35
1
24
P 37
P 83
P 84
P 79
83
P 38
92
86
10
18
15
P 28
26
6
74
16
17
P 29
P 27
20
22
21
8
7
9
73
83
82
Proterozoic
Sedimentary rocks
Sandstones, conglomerates, arenites, stromatolite
Archean
Plutonic rocks
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Sedimentary rocks
Abitibi type
Pontiac type
Timiskaming type
Volcanic rocks
Rhyolites
Basalts to rhyolites
Basalts
Komatiites to basalts
Towns
Faults
0
10
20 km
MINES
GOLD
POLYMETALLIC
PROJECTS
GOLD
POLYMETALLIC
LIMITS OF SUBDIVISIONS AS DEFINED IN THE TEXT

Figure 1C-3. Location of exploration projects and mines in the Rouyn-Noranda - Cadillac area in 2002. Modified geology from Avramtchev and Lebel-Drolet (1981) and Couture (1991).

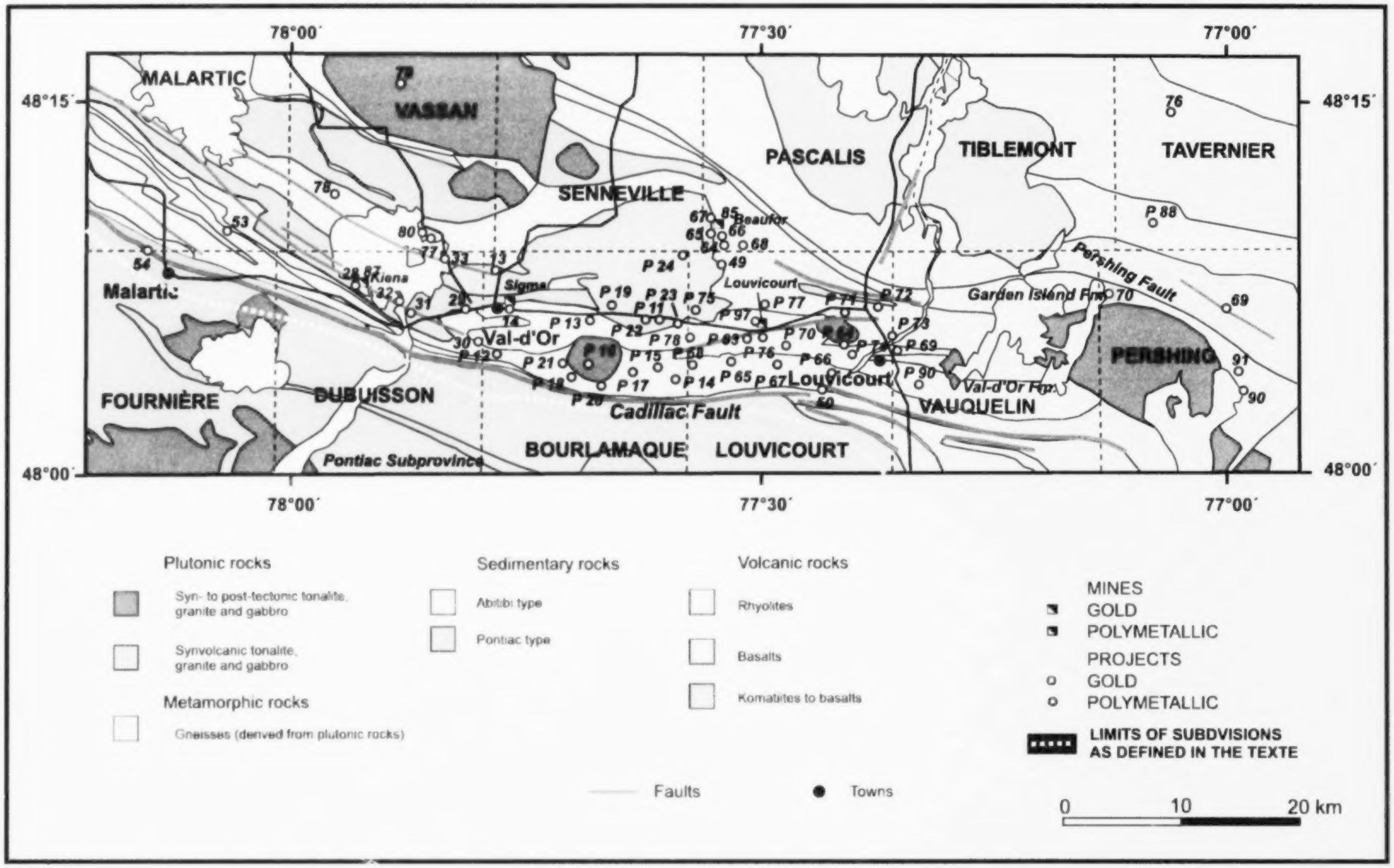
78°00´
77°30´
77°00´
48°15´
48°00´
MALARTIC
VASSAN
SENNEVILLE
PASCALIS
TIBLEMONT
TAVERNIER
FOURNIÈRE
DUBUISSON
BOURLAMAQUE
LOUVICOURT
VAUQUELIN
PERSHING
Malartic
Val-d'Or
Louvicourt
Kiena
Sigma
Beaufor
Cadillac Fault
Pershing Fault
Garden Island Fm.
Val-d'Or Fm.
Pontiac Subprovince
Plutonic rocks
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Sedimentary rocks
Abitibi type
Pontiac type
Volcanic rocks
Rhyolites
Basalts
Komatiites to basalts
MINES
GOLD
POLYMETALLIC
PROJECTS
GOLD
POLYMETALLIC
LIMITS OF SUBDVISIONS AS DEFINED IN THE TEXTE
Faults
Towns
0
10
20 km

Figure 1C-4. Location of exploration projects and mines in the Malartic-Val-d'Or area for 2002. (Modified geology from Avramtchev and Lebel-Drolet (1981) and Couture (1991)).

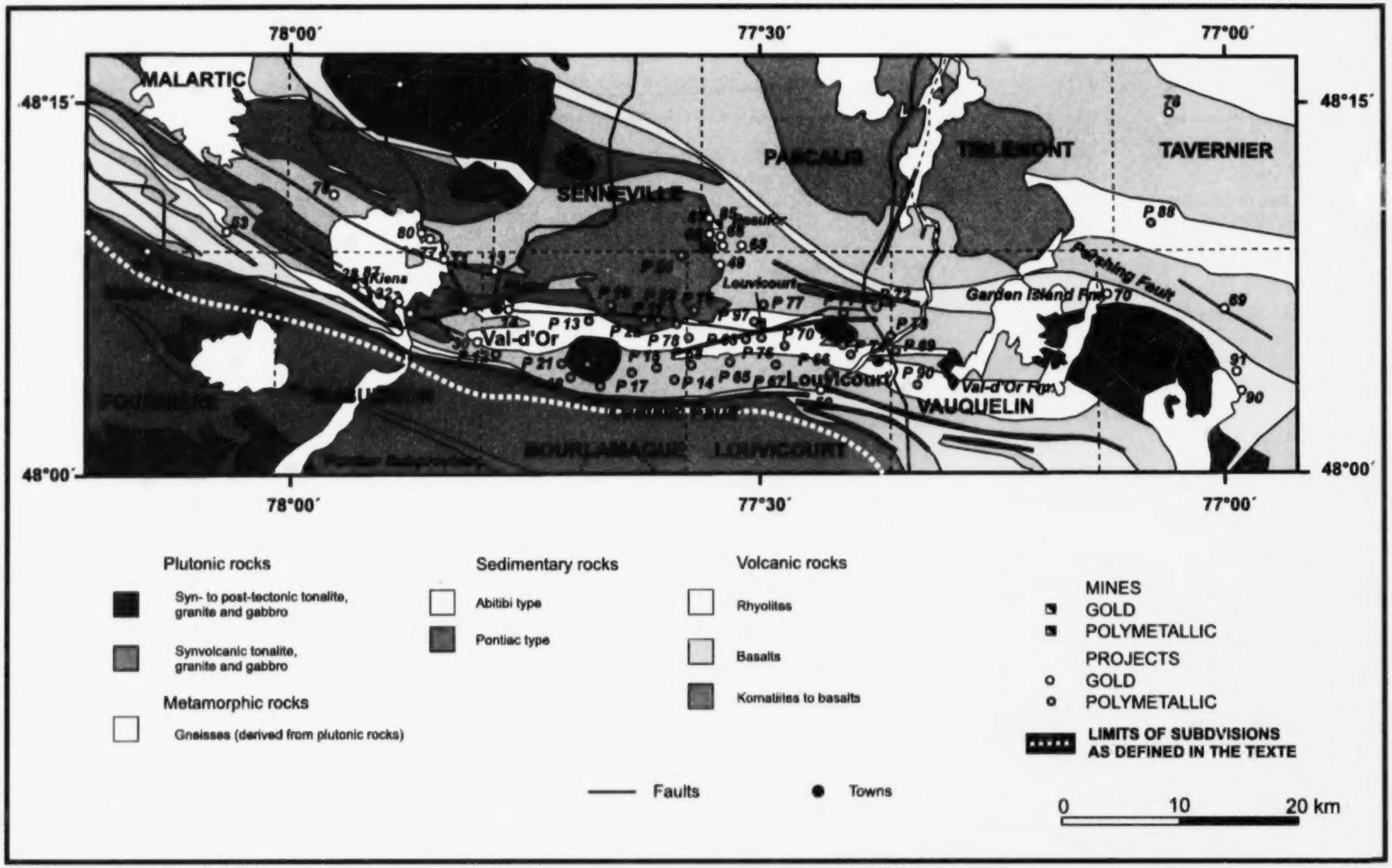
78°00′
77°30′
77°00′
48°15′
48°00′
MALARTIC
SENNEVILLE
PASCALIS
TIBLEMONT
TAVERNIER
Val-d'Or
Louvicourt
VAUQUELIN
BOURLAMAQUE
LOUVICOURT
Garden Island Fm.
Pershing Fault
Val-d'Or Fm.
Kiena
Plutonic rocks
Syn- to post-tectonic tonalite, granite and gabbro
Synvolcanic tonalite, granite and gabbro
Metamorphic rocks
Gneisses (derived from plutonic rocks)
Sedimentary rocks
Abitibi type
Pontiac type
Volcanic rocks
Rhyolites
Basalts
Komatiites to basalts
MINES
GOLD
POLYMETALLIC
PROJECTS
GOLD
POLYMETALLIC
LIMITS OF SUBDVISIONS AS DEFINED IN THE TEXTE
Faults
Towns
0
10
20 km

Figure 1C-4. Location of exploration projects and mines in the Malartic-Val-d'Or area for 2002. (Modified geology from Avramtchev and Lebel-Drolet (1981) and Couture (1991)).

TABLE 1C-1 - Exploration projects for gold in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [(1)]
1	Aiguebelle	1C-3	32D10	Agnico-Eagle Mines Ltd	Fay West	Au	Gc(ro), ET, G, Pr
2	Barraute	1C-1	32C12	Phoenix Matachewan Mines/Les Mines McWatters Inc.	Swanson	Au	Gc(h), ET, E
3	Barraute	1C-1	32C12	Mines Abcourt Inc.	Abcourt-Barvue	Au	E, ET
4	Barraute	1C-1	32C12	Alphonse Beaudoin	Barraute R VII	Au (Cu, Mo)	S(3:110),T,E
5	Barry, Urban	1C-1	32B13, 32G04	Kinross Gold Corp./Beaufield Consolidated	Barry-Urban	Au	G
6	Beauchastel	1C-3	32D03	Ressources Dasserat Inc.	R. M. Nickel (Vézina)	Au, Ni, Cu, Pb, Ag, Pt, Pd	S(13:2428)
7	*Beauchastel*	*1C-3*	*32D03*	*Mines Richmont Inc.*	*Francoeur 1A*	*Au*	*S(17:8283)*
8	*Beauchastel*	*1C-3*	*32D03*	*Mines Richmont Inc.*	*Francoeur-Norex 1B*	*Au*	*S(15:5641)*
9	Beauchastel	1C-3	32D03	Mines Richmont Inc.	Wasamac	Au	S(1:525)
10	Beauchastel	1C-3	32D03	Mines Aunore Inc.	Elder	Au	Assessment work, ET
11	Bernetz	1C-1	32C13	Denis Cyr/Pierre Larivière	Bernetz	Au, diamonds	PP, Mag
12	Beschefer	1C-1	32E15	SOQUEM INC./BHP Billiton Ltd	B14-Beschor (1273)	Au	S(4:951)
13	Bourlamaque	1C-4	32C04	International Baslen Entreprises Ltd/2629-2482 Québec Inc./Aur Resources Inc.	Harricana Mine Property	Au (Cu, Ag, Zn)	Mag, TBF, ET
14	Bourlamaque	1C-4	32C04	Les Mines McWatters Inc./Société en commandite Sigma-Lamaque	Complexe Sigma-Lamaque	Au	S(x:1286)
15	Bousquet	1C-3	32D02	Cambior Inc.	Mouska-Authier	Au, Cu	S(2:2929), DPEM, G
16	Bousquet	1C-3	32D02	Cambior Inc.	Doyon	Au	S(3:2789), DPEM, G
17	Bousquet	1C-3	32D02	Cambior Inc.	Westwood-Warrenmac	Au	S(3:2321), DPEM
18	Bousquet	1C-3	32D02	Cambior Inc./Ressources Breakwater Inc.	Bousquet-Ferris	Au, Cu	S(3:843), G
19	Bruneau, Desjardins	1C-1	32F06	Ressources Strateco Inc./Géonova Explorations Inc.	Discovery	Au	S(4:2000), ET
20	Cadillac	1C-3	32D01	Ressources Minières Radisson Inc.	O'Brien	Au	E, ET
21	Cadillac	1C-3	32D01	Agnico-Eagle Mines Ltd/Ressources Breakwater Ltd	Lapa	Au	S(7:5419), E
22	Cadillac	1C-3	32D01	Queenston Mining Inc.	Pandora	Au	PP, Mag
23	Casa Berardi	1C-1	32E06	Mines Aurizon Inc.	Casa Berardi	Au	S(x:22000), Gc(ro)
24	Cléricy, La Pause	1C-3	32D07	Agnico-Eagle Mines Ltd	South Park	Au	Gc(ro), ET, G, Pr
25	Comptois	1C-1	32F03	Exploration Maude Lake Inc./Cameco Gold Inc.	Comtois	Au	S(x:1822), Gp, PP
26	Dasserat	1C-3	32D06	Yvan Leith/Edouard Poirier	Dasserat A2 et A3	Au, Ag, Cu, Zn	S(x:290), T
27	Despinassy	1C-1	32C11	Cameco Gold Inc.	Despinassy East	Au	S(2:650)
28	Dubuisson	1C-4	32C04	Les Mines McWatters Inc.	Complexe Kiena	Au	S(38:5012), Gc(ro), E

TABLE 1C-1 - Exploration projects for gold in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK (1)
29	Dubuisson	1C-4	32C04	Ressources Pyrinor Inc.	Dubuisson	Au	S(5:800), G, E
30	Dubuisson	1C-4	32C04	SOQUEM INC.	Sylvie (1227)	Au	S(1:275)
31	Dubuisson	1C-4	31C04	Mines Western Québec Inc.	Mine École	Au	T
32	Dubuisson	1C-4	32C04	Mines Western Québec Inc.	Shawkey	Au	S(11:1248)
33	Dubuisson	1C-4	32C04	Ressources Nouveau Monde Inc.	Siscoe	Au	G
34	Duparquet	1C-3	32D06	SOQUEM INC./Géonova Exploration Inc.	Pitt Gold (1299)	Au	S(4:1047), G
35	Duparquet	1C-3	32D06	Kinross Gold Corp./Entreprises minières Globex Inc.	Duquesne Ouest	Au	S(14:5302), PP, Mag, Gc(h), G, E, Int. Sat., Gc(ro)
36	Fénélon	1C-1	32L02	International Taurus Resources Inc./Fairstar Explorations Inc.	Fénélon	Au	S(42:2100), E, G
37	Fiedmont	1C-1	32C05	Mines Abcourt Inc.	Vandôme	Au	ET
38	Gaboury	1C-1	31M07	Daniel Ferderber	Lavallée	Au	Pr, E
39	Gaboury	1C-1	31M06	9034-9473 Québec Inc./Laurent Hallé	Castor	Au, Cu, Ni, Pt, Pd	G, T
40	Gaboury	1C-1	31M06	9034-9473 Québec Inc./Laurent Hallé	Lac Honorat	Au, Cu, Ni, Pt, Pd	G, T
41	Gand	1C-1	32G12	SOQUEM INC./Graniz Mondal Inc.	Opawica (1318)	Au, Cu	E, T
42	Gand, Boyvinet, Lesueur, Lespérance	1C-1	32F09, 32G12	SOQUEM INC./Explorations Minière du Nord Ltée	Lac Shortt (1123)	Au, Cu	S(4:943), E
43	Guercheville	1C-1	32G11	Agnico-Eagle Mines Ltd/ GlobeStar Mining Corp./S.D.B.J.	Fenton	Au (Zn, Cu)	Gc(ro), E, G, Pr
44	Guillet	1C-1	31M07	Exploration Nid d'Or (2000)	Veine Champagne #1	Au, Ag, Cu, diamonds	T, E
45	Guillet	1C-1	31M07	Pierre Gervais	Belleterre	Au	T
46	Guillet	1C-1	31M07	Ressources Frenchie Inc./Ressources Jourdan Inc.	Guillet	Au	S(3:887)
47	Hébécourt	1C-3	32D11	Cambior Inc. (Cogema Resources Inc.)	Porcupine	Au	S(9:4554)
48	Laverlochère	1C-1	31M06	9034-9473 Québec Inc.	Bellehumeur	Au, Cu, Ni, Pt, Pd	Gc(h), T, Pr
49	Louvicourt	1C-4	32C04	Mines Richmont Inc./Société Minière Louvem Inc.	Courvan	Au	PP, Mag, Pr
50	Louvicourt	1C-4	32C03	SOQUEM INC./Provenor Inc.	Rivière Marias (1226)	Au	S(3:696)
51	Maizerets	1C-1	32E01	Cambior Inc.	Harricana	Au	Mag, PP
52	Maizerets, Soissons	1C-1	32E01, 32F04	Cambior Inc./Mines Aurizon Inc.	Géant Dormant	Au	GpA, G
53	Malartic	1C-4	32C04	SOQUEM INC.	Camflo N-O (1270)	Au	PP, T
54	Malartic, Fournière	1C-4	32D01	Les Mines McWatters Inc.	Complexe East Amphi	Au	Gc(ro), ET
55	McKenzie	1C-1	32G16	SOQUEM INC./Ressources Itaminéraque Inc.	Radar (1287)	Au, Cu, Zn	E, T
56	McKenzie	1C-1	32G16	SOQUEM INC./Ressources Itaminéraque Inc.	McKenzie (4581)	Au, Cu, Zn	E, T

TABLE 1C-1 - Exploration projects for gold in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [1]
57	McKenzie	1C-1	32G16	SOQUEM INC./Ressources Itaminéraque Inc.	Gilman (1291)	Au, Cu	E, T
58	McKenzie	1C-1	32G16	SOQUEM INC.	Dufault (1311)	Au, Cu	S(3:1823), E
59	McKenzie	1C-1	32G16	SOQUEM INC.	Brosman Extension (1305)	Au, Cu	E, T, G, Pr
60	McKenzie	1C-1	32G16	SOQUEM INC./Ressources Itaminéraque Inc.	Brosman (1230)	Au, Cu	S(4:1230), E, T, G, Pr
61	McKenzie, Roy	1C-1	32G16	SOQUEM INC.	Bruneau (1303)	Au, Cu	E, G, Pr
62	McKenzie, Roy, Obalski, Lemoine	1C-1	32G16	SOQUEM INC.	Chibougamau (1119)	Au, Cu	S(5:290), E
63	Montbray	1C-3	32D06	Agnico-Eagle Mines Ltd	Tarsac	Au, Ag, Pb, Mo	Gc(ro), ET, G, Pr
64	Pascalis	1C-4	32C04	Mines Richmont Inc./Société Minière Louvem Inc.	Colombière	Au	S(x:3031), PP, Mag, Pr
65	Pascalis	1C-4	32C04	Mines Richmont Inc./Société Minière Louvem Inc.	Beaufor	Au	S(x:4439), PP, Mag, ET
66	Pascalis	1C-4	32C04	Mines Richmont Inc./Société Minière Louvem Inc.	Pascalis	Au	S(x:1048), PP, Mag, ET, Pr
67	Pascalis	1C-4	32C04	Mines Richmont Inc./Société Minière Louvem Inc.	Perron	Au	PP, Mag, ET, Pr
68	Pascalis	1C-4	32C04	Gianor Mineral Inc.	Louvicourt	Au	Pr, E
69	Pershing	1C-4	32C03	Exploration Malartic-Sud Inc /Huntington Exploration Inc.	Croinor	Au	S(121:14250), PP, Gc(s)
70	Pershing	1C-4	32C03	Ressources Frenchie Inc./Ressources Jourdan Inc.	Pershing	Au	S(2:395)
71	Privat	1C-1	32D11	Philippe Letourneur	Privat	Au	T, E
72	Rale, Hazeur	1C-1	32G07/10	SOQUEM INC./Ressources Plexmar Inc.	Winchester (993)	Au	S(3:782), E
73	Rouyn	1C-3	32D03	SOQUEM INC./Ressources Itaminéraque Inc./Thundermin Resources Inc.	Lac Pelletier (1298)	Au	S(7:1519), ET
74	Rouyn, Joannes	1C-3	32D02	Cambior Inc.	Routhier	Au, base metals	S(15:2922), Mag, PP, G
75	Roy	1C-1	32G16	SOQUEM INC./Nimsken Corporation Inc.	Cummings (1307)	Au, Cu	PP, Mag, E, T
76	Tavernier	1C-4	32C03	Ressources Minières Pro-Or Inc.	Tavernier	Au (Cu, Zn, Ag)	S(7:1114)
77	Vassan	1C-4	32C04	Exploration Atlantis Inc.	Abitibi	Au	S(11:3500)
78	Vassan	1C-4	32C04	Ressources Pyrinor Inc.	Vassan	Au	S(1:150), Pr
79	Vassan	1C-4	32C05	Albert Gaulin	Laine	Au, Ni, Cu	PP, Mag

TABLE 1C-1 - Exploration projects for gold in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK (1)
80	Vassan	1C-4	32C04	Mines D'Or Wesdome Inc.	Siscoe	Au	S(3:457)
81	Verneuil	1C-1	32F02	SOQUEM INC./Ressources Minières Normabec Inc.	Verneuil (1217)	Au	S(12:2145), Mag, PP, T
82	Beauchastel	1C-3	32D02	Ressources Yorbeau Inc.	Astoria I	Au	PP, Gc(ro), Pr
83	Rouyn	1C-3	32D03	Ressources Yorbeau Inc.	Astoria II	Au	S(14:820), T, E
84	*Chaste*	*1C-1*	*32F04*	*Cambior Inc./Mines Aurizon Inc.*	*Mine Géant Dormant*	*Au, Ag*	*S(x:68 362), GpA, ET*
85	*Pascalis*	*1C-4*	*32C04*	*Mines Richmont Inc./Société Minière Louvem Inc.*	*Mine Beaufor*	*Au, Ag*	*S(46:12 771), Mag, PP*
86	*Bousquet*	*1C-3*	*32D02*	*Cambior Inc.*	*Mine Doyon*	*Au, Ag*	*S(265:46 224)*
87	*Dubuisson*	*1C-4*	*32C04*	*Les Mines McWatters Inc.*	*Mine Kiena*	*Au, Ag*	*S(38:5012)*
88	*Rohault*	*1C-1*	*32G08*	*Ressources Campbell Inc.*	*Mine Joe Mann*	*Au, Cu*	*S*
89	Casa Berardi, Laberge	1C-1	32E06	Mines Cancor Inc./Inco Ltd	Gémini	Au	S(5:1590)
90	Pershing	1C-4	32C02	Les Ressources Montigua Inc.	Pershing Gold	Au	S(x:1981), Mag, PP, G, E
91	Pershing	1C-4	32C02	Les Ressources Bermont Inc.	Manitou Gold	Au	Mag, EM
92	Cadillac	1C-3	32D01	Cambior Inc.	Mouska	Au	S

TABLE 1C-2. Exploration projects for base metals in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [1]
P1	Ailly	1C-2	32F/10	SOQUEM INC.	Vignal	diamond	Gp
P2	Baby	1C-2	31M/06	Aurora Platinum Corp.	Geoffroy	Cu-Ni-Pt-Pd	S(4:1502)
P3	Baby	1C-2	31M/06	Aurora Platinum Corp./Hinterland Metals	Belleterre	Cu-Ni-Pt-Pd	S(13:1833), Pr
P4	Baby	1C-2	31M/06	Aurora Platinum Corp./9034-9473 Québec inc.	Midrim	Cu-Ni-Pt-Pd	S(6:1510)
P5	Baby	1C-2	31M/06	Aurora Platinum Corp./9034-9473 Québec inc.	Angliers	Cu-Ni-Pt-Pd	S(1:210), Pr
P6	Bartouille	1C-2	32C/11	R. Valiquette	Bartouille	Cu-Au-Pt-Pd	Mag, PP
P7	Bearn	1C-2	32D/16	T. Coyle/R. Tremblay	Bearn PGE	PGE	PP, T
P8	Bellecombe	1C-2	32D/03	R. Bergeron	Roger Bergeron	Cu-Ag-Au-Pt-Pd	Gp
P9	Beschefer	1C-2	32E/10-15	Ressources Yorbeau inc./Explorers Alliance Inc.	Casa Berardi Ouest	Cu-Zn-Au	S(7:6905), PP, DPEM
P10	Blondeau	1C-2	31M/07	Exploration Tom inc./Exploration Loubel inc.	Kelly Lake	Cu-Ni-Pt-Pd	S(12:?), Mag, G
P11	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Général Québec	Cu-Zn-Au-Ag	GpA, compilation
P12	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Airport	Cu-Zn-Au-Ag	GpA, compilation
P13	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Auriac	Cu-Zn-Au-Ag	GpA, compilation
P14	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Sabourin Creek	Cu-Zn-Au-Ag	GpA
P15	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Annamaque	Cu-Zn-Au-Ag	GpA, compilation
P16	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Ducros	Cu-Zn-Au-Ag	GpA, compilation
P17	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Faraday	Cu-Zn-Au-Ag	GpA, compilation
P18	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Orenada	Cu-Zn-Au-Ag	S(5:1951), GpA
P19	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Standard Gold	Cu-Zn-Au-Ag	GpA, compilation
P20	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Oramaque	Cu-Zn-Au-Ag	GpA, compilation
P21	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Mid-Canada	Cu-Zn-Au-Ag	GpA, compilation
P22	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Manitou	Cu-Zn-Au-Ag	Gp, Gc(ro), G
P23	Bourlamaque	1C-4	32C/04	Les Ressources Aur inc.	Colombière	Cu-Zn-Au-Ag	Gp, Gc(ro), G
P24	Bourlamaque/ Louvicourt/Senneville	1C-4	32C/04	Les Ressources Aur inc.	Aurbel	Cu-Zn-Au-Ag	GpA, compilation
P25	Brouillan	1C-2	32E/15	SOQUEM INC.	Wagonic	Cu-Zn-Au-Ag	Pr
P26	Brouillan	1C-2	32E/15	SOQUEM INC./BHP-Billiton	B-26 Brouillan	Cu-Zn-Au-Ag	S(6:1881), Mag, PP
P27	Cadillac	1C-3	32D/08	Groupe minier Ayotte-Martel	Projet A	Cu-Zn-Au-Ni	Gp

TABLE 1C-2. Exploration projects for base metals in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [(1)]
P28	*Cadillac*	*1C-3*	*32D/08*	*Mines Agnico-Eagle Ltée*	*mine LaRonde*	*Cu-Zn-Au-Ag*	*S(359:65116), DPEM, G*
P29	Cadillac	1C-3	32D/01-08	Mines Agnico-Eagle Ltée/Barrick Gold	Bruce	Cu-Zn-Au-Ag	S(21:11067)
P30	Carpentier	1C-2	32C/06	Sudbury Contact Mines Ltd	Carpentier	Cu-Zn-Au-Ag	S(1:300)
P31	Cavelier/Galinée	1C-2	32F/12	SOQUEM INC./Ressources Metco inc.	Du Dôme-Matagami	Zn-Cu	S(2:546), PEM
P32	Comporté	1C-2	32F/11	SOQUEM INC.	Opaoca	Cu-Zn	S(2:391)
P33	Daniel	1C-2	32F/13	Noranda inc./S.D.B.J.	Persévérance	Zn-Cu-Ag-Au	S(5:1972), DPEM
P34	Desmazures	1C-2	32E/09	SOQUEM INC.	McIvor	Zn-Cu	S(2:654), PEM
P35	Des Meloizes	1C-2	32D/14	L. Lehoux	Normet	Cu-Zn-Au-Ag	Gc(h)
P36	Des Meloizes	1C-2	32D/14	P. Gosselin/F. Turcotte	Gosselin 2003	Cu-Zn-Au-Ag	T, PP
P37	*Dufresnor/Cléricy*	*1C-3*	*32D/07*	*Ressources Breakwater*	*mine Bouchard-Hébert - Kino*	*Zn-Cu-Au-Ag*	*S(?:7200), PP*
P38	Dufresnor/Rouyn	1C-3	32D/03	Ress. Strateco/Cambior inc.	Dufault	Cu-Zn-Au-Ag	S(6:2012), PP
P39	Fiedmont	1C-2	32C/05	3421856 Canada inc./9093-6725 Québec inc.	Fiedmont PGE	Ni-Cu-Pt-Pd	Pr
P40	*Galinée*	*1C-2*	*32F/12*	*Noranda inc.*	*mine Bell Allard*	*Zn-Cu-Au-Ag*	*S(22:4968)*
P41	Galinée	1C-2	32F/12	Noranda inc.	Orchan	Zn-Cu-Au-Ag	S(3:2253), DPEM
P42	Galinée	1C-2	32F/12	Noranda inc.	Galinée-Veract	Zn-Cu-Au-Ag	PP
P43	Grevet	1C-2	32F/07	M. Proulx	Lanthanide extension	rare earths	Pr, G, Mag
P44	Guercheville/La Ronde/ Du Guesclin	1C-2	32G/06	SOQUEM INC./Ressources Metco inc.	Wachigabau	PGE	Pr, Gc(ro)
P45	Guigues	1C-2	31M/11	9034-9473 Québec inc.	Lac Profond	Cu-Ni-Pt-Pd-Au	Mag, PP
P46	Guigues	1C-2	31M/11	Gesmalar inc.	Laverlochère	Cu	Gc(ro)
P47	Guillet	1C-2	31M/07	9034-9473 Québec inc.	Lac aux Sables	Cu-Ni-Pt-Pd-Au	Gc(s)
P48	Guyenne/Berry/ Trécesson/Languedoc	1C-2	32D/15-16	Teck Cominco Ltd/Northern Crown Mines Ltd/Wheaton River minerals Ltd	Amos	Cu-Zn-Au-Ag	S(5:856), Mag, PP
P49	Guyenne/Berry	1C-2	32D/15-16	Teck Cominco Ltd/Northern Crown Mines Ltd/Wheaton River minerals Ltd/Barrick Gold/ Kinross Gold Corp.	Chicobi Sud	Cu-Zn-Au-Ag	S(2:318)
P50	Hébécourt	1C-3	32D/11	Corporation minière Inmet	Hébécourt	Cu-Zn	Pr
P51	Isle-Dieu/Galinée/Daniel	1C-2	32F/12-13	Noranda inc.	Exploration régionale	Zn-Cu-Au-Ag	S(2:223), GpA
P52	Joutel/Poirier	1C-2	32E/08	SOQUEM INC./Ressources Orient inc.	Joutel West	Cu-Zn	PEM

TABLE 1C-2. Exploration projects for base metals in the Abitibi and Pontiac subprovinces in 2002.

No	TOWNSHIP	Fig.	NTS	COMPANY / PROSPECTOR	PROJECT	SUBSTANCE	WORK (1)
P53	Lacroix	1C-2	32G/03	J. Descarreaux et Associés Ltée	Lacroix	Cu-Zn-Au	S(3:288)
P54	La Gauchetière/ Desmazures	1C-2	32E/09-16	Corporation minière Inmet	Caber	Cu-Zn-Ag	S(3:1308), DPEM
P55	La Morandière	1C-2	32C/13	Corporation minière Inmet	Castagnier	Cu-Zn	Pr, G, Gp
P56	Landrienne	1C-2	32C/12	Corporation minière Inmet/ Cambior inc.	Landrienne	Cu-Zn	Gp
P57	Lantagniac/Lucière	1C-2	32J/03	SOQUEM INC /Ressources Metco inc.	Naomi	PGE	Pr, Gc(ro)
P58	La Ronde/La Roncière	1C-2	32G/12	SOQUEM INC /Ressources Metco inc.	La Ronde	PGE	G, Gc(ro)
P59	Lavergne/Vanier	1C-2	32E/02	Ressources Xemac inc.	La Sarre	diamond	Mag, Gc
P60	Laverlochère/Duhamel	1C-2	31M/07	Exploration Tom inc./Exploration Loubel inc.	Laverlochère	Cu-Ni-Pt-Pd	S(8:?)
P61	Lemoine/Rinfret/Dollier	1C-2	32G/09-16	Corporation minière Inmet/ Exploration Loubel inc.	Lemoine	Cu-Zn	S(12:8663), DPEM
P62	Levy	1C-2	32G/16	Explorateurs Innovateurs	Opémisca	Cu-Au	S(8:105), Gp, T
P63	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Chimo	Cu-Zn-Au-Ag	S(1:405), GpA, DPEM
P64	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Courageous	Cu-Zn-Au-Ag	GpA, compilation
P65	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Lourmet	Cu-Zn-Au-Ag	GpA, compilation
P66	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Trivio	Cu-Zn-Au-Ag	GpA, compilation
P67	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Orcour	Cu-Zn-Au-Ag	GpA, compilation
P68	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Valdora	Cu-Zn-Au-Ag	GpA
P69	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Lugold	Cu-Zn-Au-Ag	GpA, compilation
P70	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Abitibi	Cu-Zn-Au-Ag	GpA, compilation
P71	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Bevcon	Cu-Zn-Au-Ag	GpA, compilation
P72	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Dumont	Cu-Zn-Au-Ag	GpA, compilation
P73	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Mainstreet	Cu-Zn-Au-Ag	GpA, compilation
P74	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Sleepy Lake	Cu-Zn-Au-Ag	GpA, compilation
P75	Louvicourt	1C-4	32C/03	Les Ressources Aur inc.	Beacon	Cu-Zn-Au-Ag	GpA, Gc(ro), G
P76	Louvicourt	1C-4	32C/03	Les Ressources Aur inc. / Novicourt	Louvex	Cu-Zn-Au-Ag	GpA, DPEM, Gc(ro)
P77	Louvicourt	1C-4	32C/03	Les Ressources Aur inc. / Novicourt	Bonnefond	Cu-Zn-Au-Ag	GpA, compilation
P78	Louvicourt	1C-4	32C/03	Les Ressources Aur inc. / Cambior	Dunraine	Cu-Zn-Au-Ag	S(3:1189), Gp, DPEM
P79	Montbray	1C-3	32D/06	Mines Agnico-Eagle Ltée	Montbray E	Cu-Zn-Au-Ag	PP

TABLE 1C-2. Exploration projects for base metals in the Abitibi and Pontiac subprovinces in 2002.							
No	**TOWNSHIP**	**Fig.**	**NTS**	**COMPANY / PROSPECTOR**	**PROJECT**	**SUBSTANCE**	**WORK** [(1)]
P80	*Mountain/Grevet*	*1C-2*	*32F/02*	*Ressources Breakwater*	*mine Langlois*	*Zn-Cu-Au-Ag*	*S(?:800), expl. drift*
P81	Mountain/Grevet/Currie	1C-2	32F/02-07	Ressources Xemac inc./Hudson Bay Exploration and Development	Option Quévillon	Cu-Zn-Au-Ag	compilation
P82	Opémisca	1C-2	32J/03	SOQUEM INC./Nimsken Corp.	Michwacho	PGE-Au-Cu	Pr, Gc(ro)
P83	Preissac	1C-3	32D/07	P. Gosselin/F. Turcotte	Gos-Flo-2002	Cu-Zn-Au-Ag	T, PP
P84	Preissac	1C-3	32D/08	G. Robert/P. Cregheur/J. Frigon	Tantalite	tantalum	T, Mag
P85	Rasle/Huay/Brogniart	1C-2	32G/10	SOQUEM INC./Ressources Metco inc.	Eau Jaune	PGE	G, Gc(ro)
P86	Shehyn/Mazenod	1C-2	31M/03	Kinbauri Gold Corporation	Laniel	Cu-Ni-Pt-Pd-Au	Mag, G, Gc(s)
P87	Ste-Hélène	1C-2	32E/16	SOQUEM INC.	Samson	Cu-Zn	S(5:1588), Mag, PP
P88	Tavernier	1C-4	32C/03	G. Lachance	Tavernier (Vincent)	Cu-Zn-Au-Ag	S(1:148)
P89	Trécesson/Dalquier	1C-2	32D/09	R. Valiquette/L. Laplante	Lac Davy	Cu-Au-Ag	Gp
P90	Vauquelin	1C-4	32C/03	Les Ressources Aur inc.	Vaumon	Cu-Zn-Au-Ag	GpA
P91	SNRC 32D, 32E	1C-2		International Taurus Resources Inc./Mano River Resources	Manotaur	diamond	Gc(t)
P92	SNRC 32B/04-05, 32C/01-02-08	1C-2		Tango Mineral Resources Inc./ Explorateurs Innovateurs	Grenad-Langlade	Cu-Zn-Au-Ag	Gc(t), Gc(ro), Pr
P93	SNRC 32D,32C,32E	1C-2		Noranda inc./Novicourt/ Mines d'or Virginia inc.	Megatem Abitibi JV	Cu-Zn	S(44:8522), GpA
P94	SNRC 32E/09-10-15-16	1C-2		Ressources Majescor inc.	Nottaway Sud	diamond	Gc(t)
P95	Lemoine/Rinfret	1C-2	32G/09-16	McKenzie Bar Resources	Lac Doré	vanadium	EF
P96	Latulipe	1C-2	31M/11	Ressources Dianor inc.	Témis	PGE	Pr, Gc(s)
P97	*Louvicourt*	*1C-4*	*32C/03*	*Les Ressources Aur inc.*	*mine Louvicourt*	*Cu-Zn-Au-Ag*	*S(3:2900), GpA, PP*

EXPLORATION WORK LEGEND

E	Sampling
EF	Feasibility or market study
EM	Electromagnetic survey
ET	Technical evaluation study
Ev	Bulk sampling
G	Geological survey
Gc	Undefined geochemical survey
Gc(h)	Humus geochemical survey
Gc(l)	Lake bottom geochemical survey
Gc(ro)	Rock geochemical survey
Gc(ru)	Stream geochemical survey
Gc(s)	Soil geochemical survey
Gc(t)	Till geochemical survey
Gp	Undefined geophysical survey
GpA	Airborne geophysical survey
Int. Sat.	Satellite image interpretation
Mag	Magnetic survey
DPEM	Drillhole pulse electromagnetic survey
PP	Induced polarization survey
Pr	Prospecting
S(nb:m)	Diamond drilling (number:total metres)
Sci	Reverse circulation drilling
T	Trenching and stripping
TBF	VLF electromagnetic survey
TM	Metallurgical testing
italic	Underground exploration work
bold	Advanced-stage project
▨	MRN subsidized project

New Québec and Torngat Orogens, Southeastern Churchill Province (Core Zone), and Cape Smith Belt

Abdelali Moukhsil

Introduction

The New Québec (Labrador Trough), Torngat, and Ungava (Cape Smith belt) orogens, composed mainly of Paleoproterozoic rocks, occupy a major portion of northeastern and northern Québec (figures 1D-1, 1D-2a and 1D-2b). The Southeastern Churchill Province includes the New Québec and Torngat orogens, as well as their common hinterland (the Core Zone, composed largely of Archean rocks and occasionally referred to as the Rae Province, James *et al.*, 1996; Wardle *et al.*, 2002; Figure 1D-1).

In the New Québec Orogen, the Core Zone, and the Torngat Orogen, exploration expenditures totalled $359,000 in 2002, compared to $12.3 million in 2001. This amount includes financial assistance granted by the Québec government to the **Nunavik Mineral Exploration Fund**. The main targeted commodities were copper, nickel, platinum group elements (PGE), zinc, and cobalt. Diamond exploration also generated interest in this area (Figure 1D-1). In the Cape Smith belt, exploration expenditures totalled $8.9 million in 2002.

New Québec and Torngat Orogens and Core Zone

GEOLOGICAL OVERVIEW

The New Québec Orogen, also referred to as the Labrador Trough or "the Trough" in the present article, is located in northeastern Québec and forms a NNW-SSE-trending belt of rocks roughly 160 km wide by 1,200 km long, which extends from Hudson Strait in the north to the Grenville Front in the south (Clark, 1994). The Trough is composed of folded (SW-verging), faulted (strike-slip and/or thrust faults), and metamorphosed sedimentary and igneous rocks. The Trough rocks belong to the Kaniapiskau Supergroup, subdivided into three cycles separated by erosional unconformities (Clark, 1994). The first cycle is composed, at its base, of conglomerates and red sandstones (Chakonipau Formation) with intercalated mildly alkalic lava flows and, higher up, of platform dolomites and arenites, flyschoid sedimentary rocks, and tholeiitic basalts (Howse zone). The second cycle consists of quartz arenites at the base (Wishart Formation), overlain by cherts, pelites, and iron formation (Ruth and Sokoman formations), and capped by turbidites and tholeiitic basalts. The third cycle is marked by fluviatile sandstones and polymictic conglomerates (Tamarack River and Chioak formations; Clark, 1994). Finally, lateral variations occur from west to east across the Trough (Clark, 1994). For example, the Schefferville and Chioak zones to the west consist of platform and marine basin sediments as well as fluviatile sediments. In the centre, the Howse, Doublet, and Baby zones consist of volcanic rocks and deeper basin sediments. Eastward, the Laporte domain and the Rachel zone are composed of gneiss and schist (Figure 1D-1).

The term "Core Zone", which designates the Trough hinterland, located in the Southeastern Churchill Province, was originally proposed by James *et al.* (1996) and more recently used by Wardle *et al.* (2002). The Core Zone is composed mainly of Archean gneisses, based on radiometric ages. It may be subdivided into several lithotectonic domains separated by major shear zones. The northern part of the Core Zone is formed in part by the Paleoproterozoic Lake Harbour Group (pelitic gneiss, quartzite, and marble), metamorphosed to the amphibolite facies. The southeastern part of the Core Zone contains high-grade, metaplutonic and metavolcanic sequences (Wardle *et al.*, 2002). The western border of the zone is composed of the De Pas and Kuujjuaq batholiths (1.81 to 1.84 Ga) and the Kuujjuaq terrane (formed of supracrustal rocks and tonalitic and granitic gneiss). The eastern part is subdivided into several domains, composed largely of granulites (North River, Lac Henrietta, Anaktalik, Tasisuak, and Konrad Brook domains). The centre of the Core Zone is represented by the George River Domain, which consists of mafic and intermediate volcanic and intrusive rocks, ultramafic rocks, volcaniclastic rocks, paragneisses, and leucogranites. In the southeastern part of the Core Zone lies the Mistinibi-Raude Domain (migmatitic paragneiss, granite, and mafic to ultramafic rocks), and the volcano-sedimentary Ntshuku Complex. To the east, Paleoproterozoic and Mesoproterozoic plutonic suites intrude the Core Zone (anorthositic rocks of the Michikamau Intrusive Suite; granites and adamellites of the Mistastin Complex).

The Paleoproterozoic Torngat Orogen, oriented NW-SE, is bounded to the east by Archean rocks of the Nain Province and to the west by the Core Zone (Figure 1D-1). This orogen is divided into lithotectonic domains and complexes separated by mylonitic shear zones (*e.g.* Abloviac shear zone). The axial zone of the orogen is represented by the Tasiuyak Domain (mylonitized paragneiss, granitic diatexite with paragneiss, and enderbite). This zone is juxtaposed with the Lac Lomier

Complex, formed of paragneiss, tonalitic gneiss, and enderbite, which are deformed into alternating, km-scale bands of granulite-grade and amphibolite-grade rocks. North of the orogen, the Burwell Domain is formed of a magmatic arc composed of metaplutonic rocks (diorite-tonalite-granodiorite and charnockite-enderbite) ranging from the amphibolite to the granulite facies. To the east (foreland), in Labrador, lies the Ramah Group.

Various classifications have been established for deposits with Ni, Cu, and/or platinum group element (PGE) mineralization. We have used the classification proposed by Thériault *et al.* (2002) in the map showing Ni-Cu-PGE occurrences in Québec.

Ni-Cu-DOMINATED MAGMATIC DEPOSITS

During the summer of 2002, **Virginia Gold Mines**, in partnership with **Placer Dome**, conducted a geological reconnaissance and sampling program covering several map sheets in the northern part of the Labrador Trough (project 01, Figure 1D-1). The two companies were searching for Cu-Ni-PGE deposits associated with gabbroic sills. Disseminated sulphide zones and a few PGE showings were discovered.

In the southern part of the Labrador Trough, near Schefferville, **La Fosse Platinum Group** conducted engineering studies on samples collected in the Knob Lake Group iron formation (project 02, Figure 1D-1).

SEDIMENT-HOSTED Zn-Cu-Au-Ag±Pb DEPOSITS

Several Zn-Cu-Au-Ag±Pb sulphide deposits are known in the sandy-pelitic sequences of the second cycle in the Baby and Howse zones (Clark, 1994). In these sectors, black shales and iron formations are common and host the Koke and Kan deposits. Showings are also reported in carbonate sequences of the Abner Formation. Many of these showings are interpreted as Besshi-type deposits, a variation on the VMS theme in which the proportion of sedimentary rocks is greater than that of volcanic rocks. In the Howse zone, near Lac Musset, **Fonteneau Resources** carried out prospecting and geophysical surveys on sedimentary units that host Cu and Ag occurrences (project 03, Figure 1D-1).

During the summer of 2002, the **Fond régional d'exploration minière de la Côte-Nord (FREM)** and a group of **prospectors** (Table 1D-1) identified two sectors with Zn-Ag-Cu mineralization in the Schefferville area. They conducted grassroots prospecting, including the sampling of mineral occurrences and stream sediments in both sectors. The first area, optioned by **Metco** and located east-northeast of Schefferville, yielded anomalous Zn and Ag assays (project 04, Figure 1D-1). The mineralization is concentrated in mm- to cm-scale beds parallel to the foliation, in black shale, mudstone, mudslate, and dolomitic sandstone. Gabbros are also present in the vicinity. The mineralization is probably hosted in the Thompson Lake Formation, in the Retty lithotectonic zone. The thin beds and laminations of massive sulphides are composed mainly of pyrrhotite. Minor chalcopyrite is also observed locally, either as laminations or mm-scale pods in massive pyrrhotite. Pyrite cubes are occasionally associated with chalcopyrite pods. This type of stratiform, massive sulphide mineralization may be syngenetic and have formed as a result of submarine, exhalative, hydrothermal activity. The second sector, located north of Schefferville (project 05, Figure 1D-1), hosts SEDEX-type mineralization. Strong Zn anomalies are reported (up to 3.17 % Zn and 14 g/t Ag).

In the New Québec Orogen, the **Nunavik Mineral Exploration Fund** discovered three Zn occurrences, one of which yielded an assay of 0.93 % Zn. This is a SEDEX-type occurrence, located at the contact between the Sokoman and Menihek formations (project 08, Figure 1D-1). Another zone with massive and disseminated sulphides was discovered by the fund (project 09, Figure 1D-1). The sulphides are hosted in mudrocks and gabbro sills, and consist of pyrrhotite, pyrite, and chalcopyrite. They are probably magmatic in origin. Assay results from six samples collected from the mineralized zone range from 0.1 to 0.85 % Cu (2 g/t Ag).

DIAMONDS

Since 1999, **Twin Mining Corporation** has reported a total of 2,690 diamonds, including 1,936 macrodiamonds (stones larger than 0.5 mm in one direction). These diamonds were recovered from roughly 387 tonnes of kimberlitic bulk samples (project 11, Figure 1D-1). The largest reported diamond was 4.97 mm in size and 0.685 carat. During the year 2002, the company did not report any work on this project. However, metallurgical tests were conducted, the results of which are pending. In January 2003, in the Torngat North area, **Twin Mining Corporation** reported the recovery of 546 diamonds from 1,010.52 kg of kimberlite derived from 15 samples, ranging from 24 to 100 kg each, collected along two segments of a kimberlite dike (respectively 900 and 400 m in length). A total of 94 macrodiamonds were identified. The kimberlite dike outcrops over a strike length of 73 km and is 2.3 m wide. In one sample weighing 101.80 kg, the company recovered 99 diamonds, whereas two other samples of 24 kg each yielded 1 and 15 diamonds, respectively. The largest diamond recovered from the 900 m segment measured 2.90 mm by 2.50 mm by 1.80 mm (total = 349 diamonds and 0.174 carat), whereas the largest stone from the 400-m segment measured 1.85 mm by 1.25 mm by 1.07 mm (total = 197 diamonds and 0.128 carat).

Diamond Discoveries International Corp., in partnership with **Tandem Resources Ltd.** reported in early June 2002 that a detailed examination of samples collected during a previous campaign on their property in the Torngat Mountains area had identified roughly 60 red rubies (red corundum) and over 900 pink rubies. Twenty of the red stones were more than 2 mm in two directions (project 12, Figure 1D-1). The remaining red and pink rubies measured between 0.5 and 1.0 mm. The rubies were found in a lamprophyre or kimberlite dike traced over more than 4 km along strike. During the same period, the company also announced the discovery of two new diamond occurrences, and the presence of kimberlitic or kimberlite-related rocks, with substantial diamond potential. Following an extensive heavy mineral sampling program, the company reported the discovery of 18 kimberlite dikes and 4 pipes. In August 2002, the two partners announced their intention to pursue diamond exploration on the Pangea Lake property, where diamonds and rubies were discovered in a kimberlite dike traced for more than 5.6 km along strike. Additional exploration programs and sampling of newly discovered kimberlites were conducted on properties held by the joint venture in the Ungava Bay area.

Cape Smith Belt

GEOLOGICAL OVERVIEW

The Paleoproterozoic Cape Smith belt (also called here the Ungava Trough or the Ungava Orogen), located in northernmost Québec, consists of volcano-sedimentary rocks that extend for 370 km along an ENE axis (Figure 1D-2a) between Kangiqsujuaq on the coast of Hudson Strait and Akulivik on the coast of Hudson Bay (St-Onge and Lucas, 1990). The area is divided into four main tectonic units: i) the autochthonous Archean basement of the Superior Province, ii) the allochthonous accretion belt or the Ungava Trough *s.s.*, formed of south-verging thrust slices, iii) the Paleoproterozoic Narsajuaq Terrane, and iv) the parautochthonous Archean basement that locally separates the allochthonous accretion belt from the Narsajuaq Terrane along the Kovik antiform (Figure 1D-2a; Lamothe, 1994). The Ungava Orogen is divided into southern and northern lithotectonic domains, separated by the Bergeron fault. These domains comprise seven tectono-stratigraphic units (Lamothe, 1994). The southern domain is composed of three groups, which are mentioned below from south to north. The Lamarche Group is formed of proximal to distal sediments, intruded by several gabbro sills. The Povungnituk Group overlies the Archean basement, along an angular unconformity. A detachment fault developed later along the unconformity (Moorhead, 1996). The Povungnituk Group is composed of continental, tholeiitic basalt flows (Cecilia and Beauparlant formations), with intercalated detrital sediments (Nuvilic and Dumas formations). The entire sequence is invaded by numerous mafic to ultramafic sills. The Chukotat Group consists mainly of komatiitic to tholeiitic basalts. It is thrust onto the Povungnituk and also marks the transition from a continental to an oceanic environment. The northern domain is represented by a single formation and four groups. The Chassé Formation consists of a thin parautochthonous detrital unit. Sedimentary and metavolcanic rocks of the Watts Group are cross-cut by ultramafic and mafic (peridotite, pyroxenite, and gabbro) to felsic intrusions and thrust onto the Chukotat Group to the south, along the Bergeron fault. To the north, they are separated from the Archean basement by a detachment zone (Deception Complex). The Parent Group is formed of an assemblage of tholeiitic basalt flows and tuffs, which are associated with felsic tuffs and dacitic to rhyolitic domes. The Spartan Group is composed mainly of psammites, pelites, semipelites, and sandstones, with local felsic tuff units and thick mudstone beds. The Perrault Group consists of a detrital assemblage of wackes, conglomerates, feldspathic sandstones, and mudstones (Lamothe, 1994).

Ni-Cu-DOMINATED MAGMATIC DEPOSITS

Since 1998, **Société minière Raglan du Québec**, a wholly owned subsidiary of **Falconbridge Ltd.**, has been operating an underground and open pit mine (project 13, figures 1D-2a and 1D-2b). An initial amount of $550 million was invested in the mine, mill, and related infrastructure. The ore deposit consists of several massive sulphide lenses associated with Proterozoic ultramafic flows, which are situated along the contact between tholeiitic basalts and sediments of the Povungnituk Group and komatiitic basalts of the Chukotat Group. Twenty-three samples from the Raglan mine yielded an average grade of 4.49 % Ni, 1.22 % Cu, 1.3 g/t Pt, and 2.9 g/t Pd. Reserves at the mine are estimated at 9.0 million tonnes grading 3.06 % Ni and 0.89 % Cu. Nine ore zones have been identified over a distance of 55 km in the mining camp (Donaldson, Boundary, West Boundary, 13-15, 5-8, Katinniq, 2-3, East Lake, and Cross Lake). The main sulphides are pentlandite and pyrrhotite. Chalcopyrite, magnetite, and pyrite also occur. In addition to Ni and Cu, the ores contain values in Co and PGE. In 2002, **Société minière Raglan du Québec** completed diamond drilling and geophysical surveys that resulted in the discovery of two mineralized zones, namely the Katinniq and 5-8 zones.

During the year, **Canadian Royalties Inc.** and **Ungava Minerals Corporation** drilled several holes on their properties (Expo-Ungava and Phoenix) in Nunavik, about 15 km south of the Raglan mine. On the Mesamax NW project (project 14, Figure 1D-2a), disseminated and massive sulphides with Ni-Cu-Pt-Pd mineralization were intersected in drillholes up to 20 km west of the Expo-Ungava property. The ultramafic host unit has been traced for at least 20 km and is associated with a series of ultramafic units that extend for 40 km along strike, on the property held jointly with **Expo-Ungava**. These units extend into properties held 100 % by **Canadian Royalties Inc**. The latter may earn up to 80 % interest in the Expo-Ungava property. The mineralized zones consist of irregular lenses with a variety of textures (disseminated, net-textured, or massive sulphides). The zones are found at the base of peridotite and/or pyroxenite sills. These sills are most likely cogenetic with the magmatic episode that led to the emplacement of units of the Chukotat Group and are injected into volcano-sedimentary units of the Povungnituk Group. On November 11, 2002, the company released remarkable assay results (Ni, Cu, Co, Pt, Pd, Au) from core samples derived from three drillholes collared in the Mesamax Northwest Grid Area. The drillholes intersected disseminated, net-textured, and massive sulphides, mainly pyrrhotite, pentlandite, and chalcopyrite. The drillholes are located 60 m north of the 32-metre thick, massive sulphide intersection obtained in drillhole MXNW-01-02. The best grades reported during the latest drill program were: 2.19 % Ni, 5.92 % Cu, 0.09 % Co, 1.30 g/t Au, 1.40 g/t Pt, and 2.65 g/t Pd in drillhole MXNW-02-17, which intersected continuous sulphide mineralization over 66 m; 3.32 % Ni, 4.01 % Cu, 0.13 % Co, 0.26 g/t Au, 1.52 g/t Pt, and 5.17 g/t Pd in drillhole MXNW-02-18, which intersected pyrrhotite, pentlandite, and chalcopyrite mineralization over 49.3 m. High-grade intervals in the latter drillhole were re-assayed and announced in a press release dated November 19, 2002. The results were: 3.32 % Ni, 4.01 % Cu, 0.13 % Co, 0.26 g/t Au, 1.52 g/t Pt, and 30.3 g/t Pd. Drillhole MXNW-02-19 intersected a sulphide-rich, ultramafic unit over a 21.2-m interval and yielded grades of 1.79 % Ni, 4.46 % Cu, 0.07 % Co, 0.28 g/t Au, 0.72 g/t Pt, and 12.40 g/t Pd. Other interesting drill results were reported from the Mesamax zone, where grades ranged from 1.10 to 3.23 % Ni, 1.00 to 3.93 % Cu, 0.05 to 0.11 % Co, 0.06 to 1.01 g/t Au, 0.64 to 1.09 g/t Pt, and 1.04 to 4.89 g/t Pd. They were obtained over intervals ranging from 17.70 to 31.75 m.

Canadian Royalties Inc. and **Ungava Minerals Corporation** completed a drill program on the TK zone on the Phoenix property, located 3.5 km west of the Mesamax project, and 20 km south of the Raglan mining camp (project 15, Figure 1D-2a). Drillhole TK-02-21 yielded the following grades over 4.05 m: 2.28 % Ni, 2.01 % Cu, 0.15 % Co, 0.45 g/t Pt, and 2.87 g/t Pd. A 10.55-m interval from drillhole TK-02-15 yielded grades of 1.92 % Ni, 1.78 % Cu, 0.12 % Co, 0.46 g/t Au, 0.56 g/t Pt, and 2.16 g/t Pd. Drillhole TK-02-22 intersected 5.94 m at a grade of 2.14 % Ni, 1.24 % Cu, 0.13 % Co, 0.30 g/t Pt, and 1.88 g/t Pd. The ore zone consists of massive sulphides found near the base of a Raglan-type ultramafic sill ("TK sill").

Opportunities for Exploration

BASE METALS

Over the past sixty years, numerous showings have been discovered in the New Québec Orogen (Clark, 1994). Discovered commodities are as variable as their host rocks (Fe, Mn, Ni, Pd, Pt, Zn, Au, U, Zr, Y, Nb, Be, and rare earths, in igneous, sedimentary, and metamorphic rocks). The arrival of new players in this area, combined with the discovery in the summer of 2002 of two new sectors with anomalous Zn, Cu, and Ag by the FREM and prospectors, provide an opportunity to focus on these types of deposits. The mineral potential for base and precious metals appears to be fairly high in these sectors, especially when these deposits are associated with iron formations (*e.g.* middle Baby Formation). According to Clark and Wares (in preparation), the economic potential of the New Québec Orogen lies mainly in lithologies that host exhalative massive sulphides with Zn-Pb-Cu-Ag-Au, sediment-hosted stratiform Cu deposits, magmatic Cu-Ni-PGE deposits in picritic flows and sills, and lode gold deposits. This leads us to recommend several sectors. The Lafortune Lake area appears to have a promising potential for Zn-Pb-Cu-Ag-Au exhalative massive sulphide deposits (type 3b). The Baby and Menihek formations represent prime targets for this type of deposit. The Romanet Lake area, known for its disseminated and vein-type Cu deposits (particularly type 5c) is a highly prospective area, especially in the Dunphy Formation, which offers a very promising exploration potential (Clark, 1994). The Retty Lake (1 to 2.5 % Cu+Ni and 1.13 g/t Pt+Pd; Clark, 1994) and Gerido Lake (1.95 % Cu, 0.66 % Ni, and 0.10 % Co) areas contain several massive and disseminated sulphide deposits hosted in mafic to ultramafic sills (Clark, 1994). These areas constitute good targets for magmatic Cu-Ni-PGE deposits. Although known Cu-Ni occurrences in these sectors tend to be low-grade, other lenses may be discovered through additional exploration. Geochemical anomalies around Hayot Lake warrant additional prospecting for polymetallic deposits.

The latest results released by **Canadian Royalties Inc.** outline the excellent PGE potential of ultramafic sills cogenetic with the Chukotat Group and injected in the Povungnituk Group. This area is currently one of the hottest in Québec for mineral exploration, given the significant volume of mafic and ultramafic lava flows and sills. The next phase will involve delineating sufficient tonnage of ore for an economically viable operation. The strong commitment of Canadian Royalties Inc. (following significant Ni, Cu, and PGE results reported in press releases issued by the company), combined with the presence of the Raglan mine in this area, will help maintain and quite likely markedly increase exploration expenditures and activities in the search for magmatic Ni-Cu-PGE deposits in the Cape Smith belt. Despite the growing number of claims that were designated over the past few months, certain segments of the Cape Smith belt, where ultramafic rocks of the Chukotat Group and Raglan-type sills in the Povungnituk Group occur, have yet to be explored. This is particularly true of the western part of the belt, which has seen very little exploration (apart from the area subject to the proposed Monts de Povungnituk Park).

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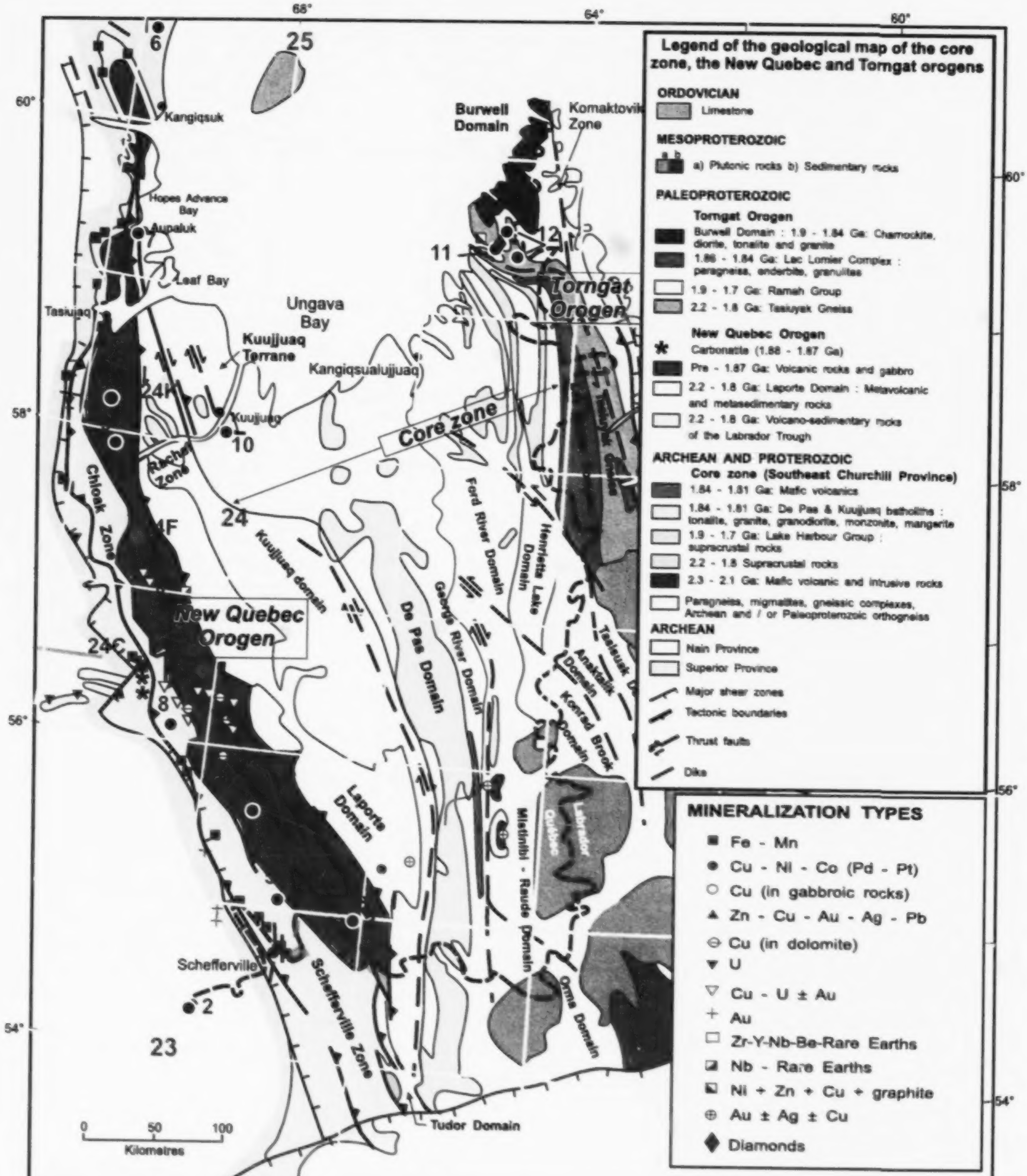

Legend of the geological map of the core zone, the New Quebec and Torngat orogens
ORDOVICIAN
Limestone
MESOPROTEROZOIC
a b
a) Plutonic rocks b) Sedimentary rocks
PALEOPROTEROZOIC
Torngat Orogen
Burwell Domain : 1.9 - 1.84 Ga: Charnockite, diorite, tonalite and granite
1.86 - 1.84 Ga: Lac Lomier Complex : paragneiss, enderbite, granulites
1.9 - 1.7 Ga: Ramah Group
2.2 - 1.8 Ga: Tasiuyak Gneiss
New Quebec Orogen
Carbonatite (1.88 - 1.87 Ga)
Pre - 1.87 Ga: Volcanic rocks and gabbro
2.2 - 1.8 Ga: Laporte Domain : Metavolcanic and metasedimentary rocks
2.2 - 1.8 Ga: Volcano-sedimentary rocks of the Labrador Trough
ARCHEAN AND PROTEROZOIC
Core zone (Southeast Churchill Province)
1.84 - 1.81 Ga: Mafic volcanics
1.84 - 1.81 Ga: De Pas & Kuujjuaq batholiths : tonalite, granite, granodiorite, monzonite, mangerite
1.9 - 1.7 Ga: Lake Harbour Group : supracrustal rocks
2.2 - 1.8 Supracrustal rocks
2.3 - 2.1 Ga: Mafic volcanic and intrusive rocks
Paragneiss, migmatites, gneissic complexes, Archean and / or Paleoproterozoic orthogneiss
ARCHEAN
Nain Province
Superior Province
Major shear zones
Tectonic boundaries
Thrust faults
Dike
MINERALIZATION TYPES
■ Fe - Mn
● Cu - Ni - Co (Pd - Pt)
○ Cu (in gabbroic rocks)
▲ Zn - Cu - Au - Ag - Pb
⊖ Cu (in dolomite)
▼ U
▽ Cu - U ± Au
+ Au
☐ Zr-Y-Nb-Be-Rare Earths
◪ Nb - Rare Earths
◩ Ni + Zn + Cu + graphite
⊕ Au ± Ag ± Cu
◆ Diamonds
68°
64°
60°
60°
58°
56°
54°
6
25
Kangiqsuk
Burwell Domain
Komaktovik Zone
Hopes Advance Bay
Aupaluk
Leaf Bay
11
12
Torngat Orogen
Tasiujaq
Ungava Bay
Kuujjuaq Terrane
Kangiqsualujjuaq
24H
Kuujjuaq
10
Core zone
Rachel Zone
Chioak Zone
4F
24
Kuujjuaq domain
Ford River Domain
Henrietta Lake Domain
Tasiuyak Gneiss
De Pas Domain
George River Domain
New Quebec Orogen
24C
8
Tasiuyak
Anaktalik Domain
Konrad Brook Domain
Laporte Domain
Mistinibi - Raude Domain
Labrador
Quebec
Schefferville
Schefferville Zone
Orma Domain
2
23
Tudor Domain
0 50 100
Kilometres

Modified from Wardle *et al.*, 1990 and 2002

Figure 1D-1. Location of the 2002 mining exploration projects in the New Quebec orogen, Torngat orogen and in the core zone.

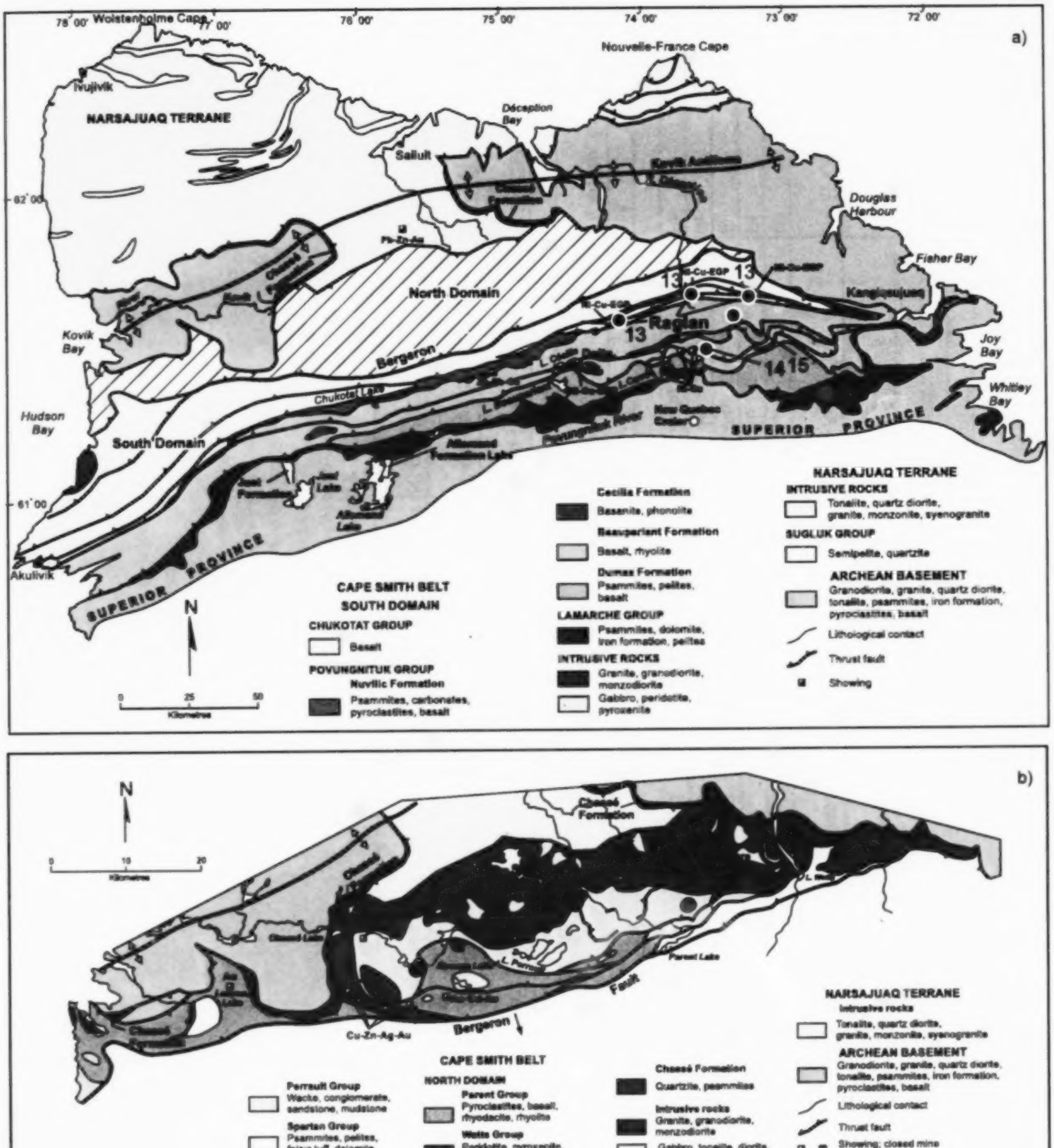
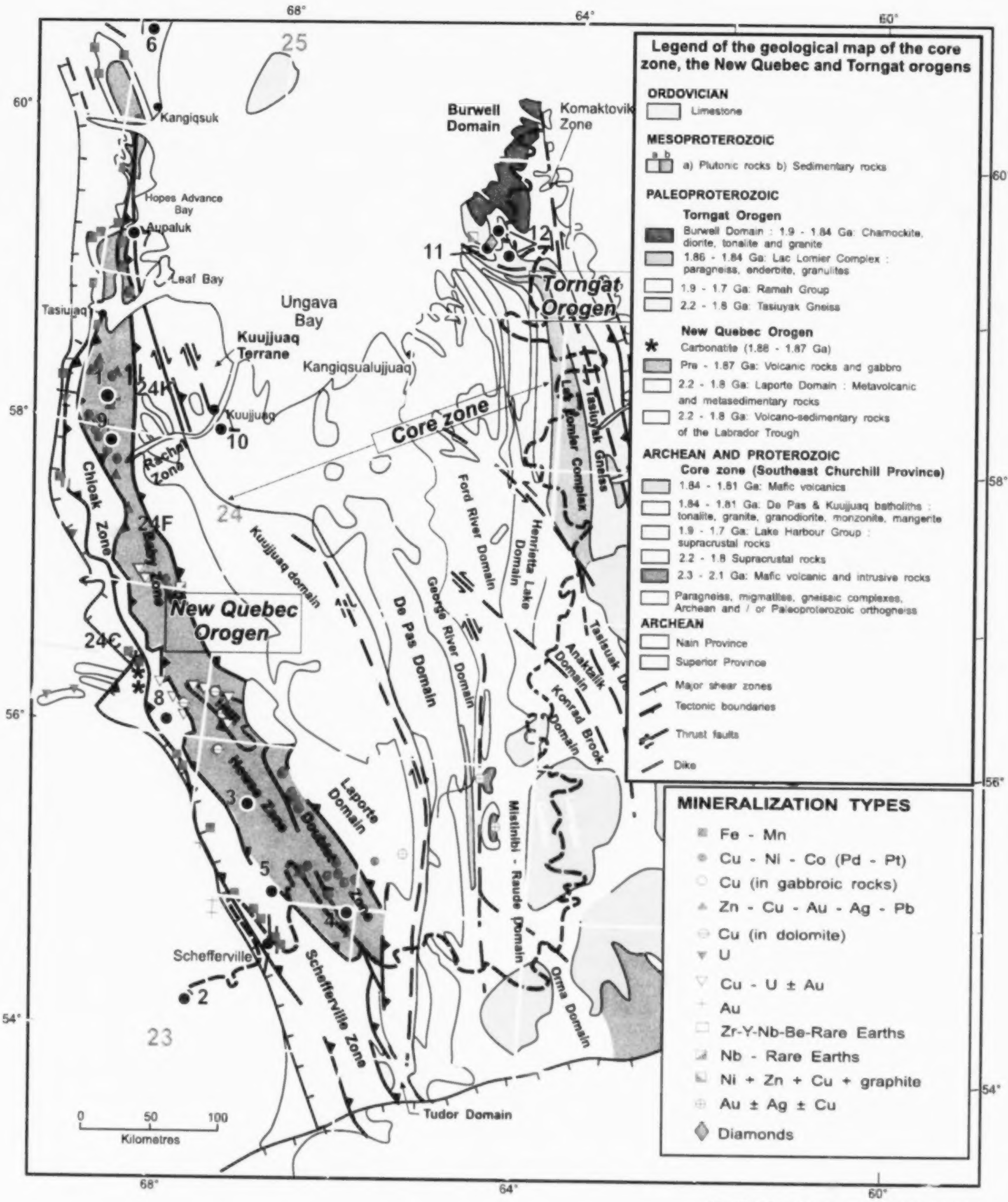
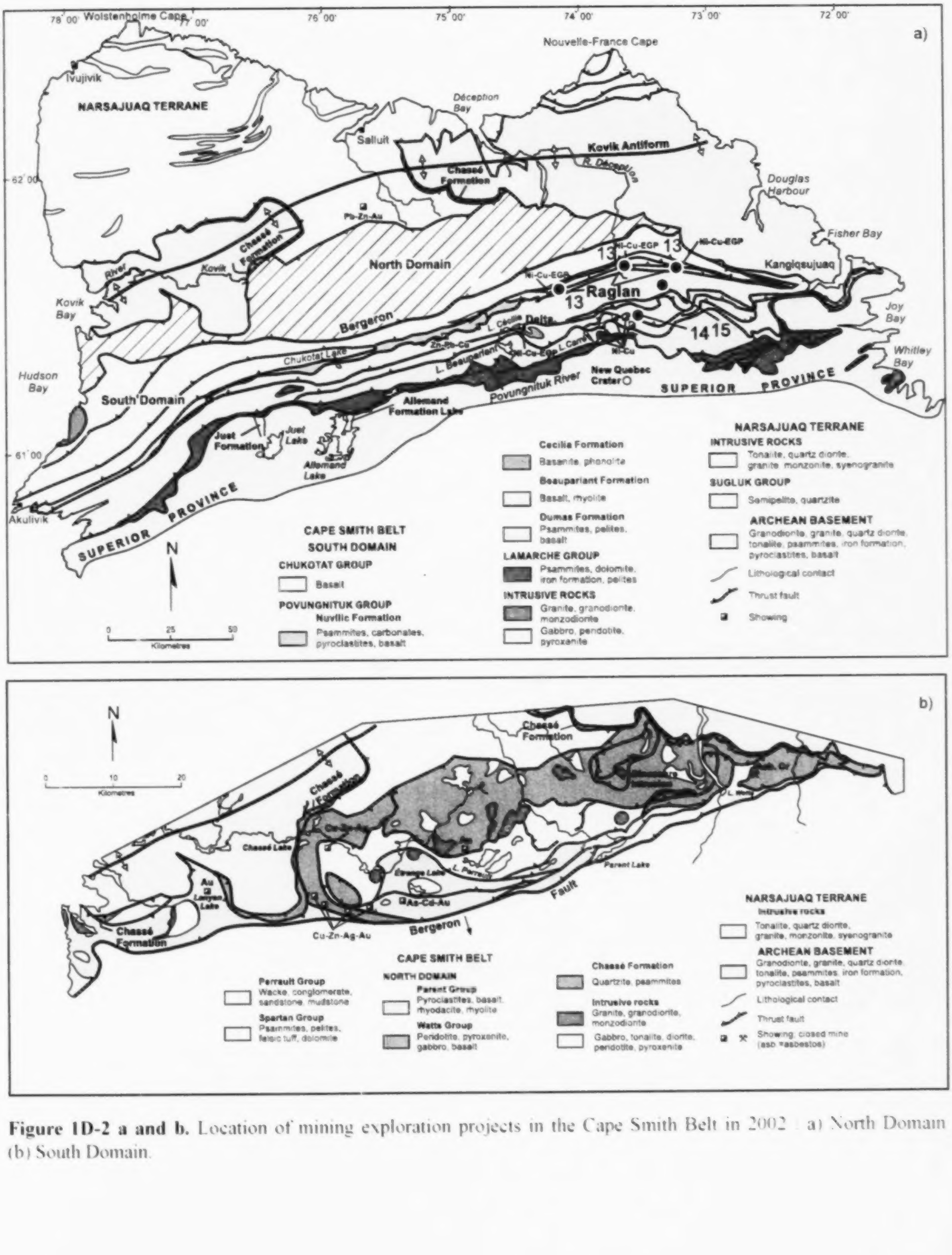

a)
78° 00'
Wolstenholme Cape
77° 00'
76° 00'
75° 00'
74° 00'
73° 00'
72° 00'
62° 00'
61° 00'
Nouvelle-France Cape
Ivujivik
NARSAJUAQ TERRANE
Déception Bay
Salluit
Douglas Harbour
Fisher Bay
Kangiqsujuaq
Kovik Bay
Joy Bay
Whitley Bay
Hudson Bay
North Domain
South Domain
Raglan
13
14
15
Ni-Cu-EGP
Pb-Zn-Au
Bergeron
Chukotat Lake
New Quebec Crater
SUPERIOR PROVINCE
Akulivik
N
0
25
50
Kilometres
CAPE SMITH BELT
SOUTH DOMAIN
CHUKOTAT GROUP
Basalt
POVUNGNITUK GROUP
Nuvilic Formation
Psammites, carbonates, pyroclastites, basalt
Cecilia Formation
Basanite, phonolite
Beauparlant Formation
Basalt, rhyolite
Dumas Formation
Psammites, pelites, basalt
LAMARCHE GROUP
Psammites, dolomite, iron formation, pelites
INTRUSIVE ROCKS
Granite, granodiorite, monzodiorite
Gabbro, peridotite, pyroxenite
NARSAJUAQ TERRANE
INTRUSIVE ROCKS
Tonalite, quartz diorite, granite, monzonite, syenogranite
SUGLUK GROUP
Semipelite, quartzite
ARCHEAN BASEMENT
Granodiorite, granite, quartz diorite, tonalite, psammites, iron formation, pyroclastites, basalt
Lithological contact
Thrust fault
Showing
b)
N
0
10
20
Kilomètres
Chassé Formation
Parent Lake
Fault
Bergeron
Cu-Zn-Ag-Au
CAPE SMITH BELT
NORTH DOMAIN
Perrault Group
Wacke, conglomerate, sandstone, mudstone
Spartan Group
Psammites, pelites, felsic tuff, dolomite
Parent Group
Pyroclastites, basalt, rhyodacite, rhyolite
Watts Group
Peridotite, pyroxenite, gabbro, basalt
Chassé Formation
Quartzite, psammites
Intrusive rocks
Granite, granodiorite, monzodiorite
Gabbro, tonalite, diorite, peridotite, pyroxenite
NARSAJUAQ TERRANE
Intrusive rocks
Tonalite, quartz diorite, granite, monzonite, syenogranite
ARCHEAN BASEMENT
Granodiorite, granite, quartz diorite, tonalite, psammites, iron formation, pyroclastites, basalt
Lithological contact
Thrust fault
Showing; closed mine (asb asbestos)

Figure 1D-2 a and b. Location of mining exploration projects in the Cape Smith Belt in 2002 : a) North Domain (b) South Domain.


Legend of the geological map of the core zone, the New Quebec and Torngat orogens
ORDOVICIAN
Limestone
MESOPROTEROZOIC
a b
a) Plutonic rocks b) Sedimentary rocks
PALEOPROTEROZOIC
Torngat Orogen
Burwell Domain : 1.9 - 1.84 Ga: Charnockite, diorite, tonalite and granite
1.86 - 1.84 Ga: Lac Lomier Complex : paragneiss, enderbite, granulites
1.9 - 1.7 Ga: Ramah Group
2.2 - 1.8 Ga: Tasiuyak Gneiss
New Quebec Orogen
* Carbonatite (1.88 - 1.87 Ga)
Pre - 1.87 Ga: Volcanic rocks and gabbro
2.2 - 1.8 Ga: Laporte Domain : Metavolcanic and metasedimentary rocks
2.2 - 1.8 Ga: Volcano-sedimentary rocks of the Labrador Trough
ARCHEAN AND PROTEROZOIC
Core zone (Southeast Churchill Province)
1.84 - 1.81 Ga: Mafic volcanics
1.84 - 1.81 Ga: De Pas & Kuujjuaq batholiths : tonalite, granite, granodiorite, monzonite, mangerite
1.9 - 1.7 Ga: Lake Harbour Group : supracrustal rocks
2.2 - 1.8 Supracrustal rocks
2.3 - 2.1 Ga: Mafic volcanic and intrusive rocks
Paragneiss, migmatites, gneisaic complexes, Archean and / or Paleoproterozoic orthogneiss
ARCHEAN
Nain Province
Superior Province
Major shear zones
Tectonic boundaries
Thrust faults
Dike
MINERALIZATION TYPES
Fe - Mn
Cu - Ni - Co (Pd - Pt)
Cu (in gabbroic rocks)
Zn - Cu - Au - Ag - Pb
Cu (in dolomite)
U
Cu - U ± Au
Au
Zr-Y-Nb-Be-Rare Earths
Nb - Rare Earths
Ni + Zn + Cu + graphite
Au ± Ag ± Cu
Diamonds
68°
64°
60°
58°
56°
54°
6
25
Kangiqsuk
Burwell Domain
Komaktovik Zone
Hopes Advance Bay
Aupaluk
7
11
12
Leaf Bay
Ungava Bay
Torngat Orogen
Tasiujaq
Kuujjuaq Terrane
Kangiqsualujjuaq
1
24K
Kuujjuaq
9
10
Core zone
Chioak Zone
Rachel Zone
24
Tasiuyak Gneiss
Lac Lomier Complex
Kuujjuaq domain
Ford River Domain
Henrietta Lake Domain
24F
Baby Zone
New Quebec Orogen
De Pas Domain
George River Domain
24C
Tasiusuak Domain
Anaktalik Domain
Konrad Brook Domain
8
Hurdle Zone
Howse Zone
Laporte Domain
Doublet Zone
3
Mistinibi - Raude Domain
5
4
Schefferville
Schefferville Zone
Orma Domain
2
23
Tudor Domain
0 50 100
Kilometres

Modified from Wardle *et al.*, 1990 and 2002

Figure 1D-1. Location of the 2002 mining exploration projects in the New Quebec orogen, Torngat orogen and in the core zone.



a)
78°00'
Wolstenholme Cape
77°00'
76°00'
75°00'
74°00'
73°00'
72°00'
62°00'
61°00'
Nouvelle-France Cape
Ivujivik
NARSAJUAQ TERRANE
Déception Bay
Salluit
Kovik Antiform
Chassé Formation
R. Déception
Douglas Harbour
Pb-Zn-Au
Fisher Bay
Ni-Cu-EGP
13
Kangiqsujuaq
Kovik River
North Domain
Raglan
Kovik Bay
Bergeron
L. Cécilia
Delta
Joy Bay
14
15
Zn-Pb-Cu
Chukotat Lake
L. Beauparlant
Ni-Cu
L. Carré
Whitley Bay
Hudson Bay
New Quebec Crater
SUPERIOR PROVINCE
South Domain
Povungnituk River
Allemand Formation Lake
Juet Formation
Juet Lake
Allemand Lake
Akulivik
N
0
25
50
Kilometres
CAPE SMITH BELT
SOUTH DOMAIN
CHUKOTAT GROUP
Basalt
POVUNGNITUK GROUP
Nuvilic Formation
Psammites, carbonates, pyroclastites, basalt
Cecilia Formation
Basanite, phonolite
Beauparlant Formation
Basalt, rhyolite
Dumas Formation
Psammites, pelites, basalt
LAMARCHE GROUP
Psammites, dolomite, iron formation, pelites
INTRUSIVE ROCKS
Granite, granodiorite, monzodiorite
Gabbro, peridotite, pyroxenite
NARSAJUAQ TERRANE
INTRUSIVE ROCKS
Tonalite, quartz diorite, granite, monzonite, syenogranite
SUGLUK GROUP
Semipelite, quartzite
ARCHEAN BASEMENT
Granodiorite, granite, quartz diorite, tonalite, psammites, iron formation, pyroclastites, basalt
Lithological contact
Thrust fault
Showing
b)
N
0
10
20
Kilometres
Chassé Formation
Chassé Lake
Au
Lamyen Lake
Éwange Lake
L. Perrault
Parent Lake
As-Cd-Au
Cu-Zn-Ag-Au
Fault
Bergeron
L. Watts
CAPE SMITH BELT
NORTH DOMAIN
Perrault Group
Wacke, conglomerate, sandstone, mudstone
Spartan Group
Psammites, pelites, felsic tuff, dolomite
Parent Group
Pyroclastites, basalt, rhyodacite, rhyolite
Watts Group
Peridotite, pyroxenite, gabbro, basalt
Chassé Formation
Quartzite, psammites
Intrusive rocks
Granite, granodiorite, monzodiorite
Gabbro, tonalite, diorite, peridotite, pyroxenite
NARSAJUAQ TERRANE
Intrusive rocks
Tonalite, quartz diorite, granite, monzonite, syenogranite
ARCHEAN BASEMENT
Granodiorite, granite, quartz diorite, tonalite, psammites, iron formation, pyroclastites, basalt
Lithological contact
Thrust fault
Showing, closed mine (asb =asbestos)

Figure 1D-2 a and b. Location of mining exploration projects in the Cape Smith Belt in 2002 : a) North Domain (b) South Domain.

TABLE 1D-1 - Mineral Exploration projects in the New Quebec and Torngat Orogens, the Core Zone and the Cape Smith Belt for 2002

No	Fig.	NTS	COMPAGNY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [1]
New Québec Orogen						
1	1D-1	24K/03,04,05,06	Virginia Gold Mines/Placer Dome	Fosse Pd-Pt	Cu-Ni-PGE	Pr, E
2	1D-1	23J/05	La Fosse Platinum Group	Knob Lake	Iron oxides	Engineering study
3	1D-1	23O/11	Fonteneau Resources Ltd	Lac Musset	Cu-Ag	Pr, Gp
4	1D-1	23I/13	Michel Castilloux, Serge Petitpas, Robert Guillemette/METCO/F.R.E.M.	Zinc Nord	Zn-Cu-Ag	Pr, E, Gc(s)
5	1D-1	23O/03	Michel Castilloux, Serge Petitpas, Robert Guillemette	Lac Hayot 2002	Zn-Cu-Ag	Pr, E, Gc(s)
6	1D-1	25C/12	David Okpik	Hall Bay	Ni-Cu-Au	Pr
7	1D-1	24N/06	Davidee Lucassie	Tikiralujjuap	Ni-Cu-Au-Pb-Zn	Pr
8	1D-1	24C/01	Nunavik mineral Exploration Fund	Otelnuk	Zn-Cu-Pb	E
9	1D-1	24F/13,14	Nunavik mineral Exploration Fund	Kuukok	Cu-Ni-Au-Ag	Pr, E
10	1D-1	24K/01	Nunavik mineral Exploration Fund	Kuujjuaq	Au-ETR-Cu	Pr
Core zone and Torngat Orogen						
11	1D-1	24P/06	Twin Mining Corporation	Torngat	Diamond	TM
12	1D-1	24P/07, 08, 11	Diamond Discoveries International/Tandem Resources Ltd	Pangea Lake	Diamond - rubis	Pr, G, Gp, Ev
Cape Smith Belt						
13	1D-2a, 1D-2b	35G/09	Falconbridge Ltd	Raglan Mine	Ni-Cu-PGE	S(110:39000m), EM, DPEM
14	1D-2a	35H/10	Canadian Royalties Inc./Ungava Minerals Corporation	Mesamax/ Expo-Ungava	Ni-Cu-Au-Co-PGE	Pr, S(116:10838m)
15	1D-2a	35H/11, 12	Canadian Royalties Inc./Ungava Minerals Corporation	Phoenix (TK)	Ni-Cu-PGE	G, EM, Mag, Gc(ro), S

EXPLORATION WORK LEGEND

E	Sampling
EF	Feasibility or market study
EM	Electromagnetic survey
ET	Technical evaluation study
Ev	Bulk sampling
G	Geological survey
Gc	Undefined geochemical survey
Gc(h)	Humus geochemical survey
Gc(l)	Lake bottom geochemical survey
Gc(ro)	Rock geochemical survey
Gc(ru)	Stream geochemical survey
Gc(s)	Soil geochemical survey
Gc(t)	Till geochemical survey
Gp	Undefined geophysical survey
GpA	Airborne geophysical survey
Int. Sat.	Satellite image interpretation
Mag	Magnetic survey
DPEM	Drillhole pulse electromagnetic survey
PP	Induced polarization survey
Pr	Prospecting
S(nb:m)	Diamond drilling (number:total metres)
Sci	Reverse circulation drilling
T	Trenching and stripping
TBF	VLF electromagnetic survey
TM	Metallurgical testing
italic	Underground exploration work
bold	Advanced-stage project
▨	MRN subsidized project

Grenville Province

Serge Perreault
Abdelali Moukhsil

Introduction

The Grenville Province extends for more than 2,000 km along the north shore of the St. Lawrence River and ranges from 300 to 600 km wide. It lies along the southeastern part of the Canadian Shield, from Labrador (northeast) to the Great Lakes (southwest). The Grenville Province is divided into three major lithotectonic elements: the Parautochthonous Belt, the Allochthonous Monocyclic Belt, and the Allochthonous Polycyclic Belt (Rivers *et al.*, 1989). Archean rocks of the Superior Province and Paleoproterozoic rocks of the Otish basin and New Québec Orogen are separated from the Parautochthonous Belt by the Grenville Front (Figure 1E-1), a major and complex structure oriented northeast-southwest. The Front is characterized by a northwest-verging thrust movement and by late strike-slip movements.

In the Abitibi-Témiscamingue region, the Parautochthonous Belt, located immediately south of the Grenville Front, is formed of reworked Archean rocks of the Pontiac and Abitibi subprovinces. In the Chibougamau area, it consists of rocks from the Archean Abitibi and Opatica subprovinces, as well as Paleoproterozoic rocks of the Otish basin. In the Fermont area, the Parautochthonous Belt consists of Archean rocks of the Ashuanipi Subprovince and Paleoproterozoic rocks of the New Québec Orogen (Labrador Trough), as well as Mesoproterozoic metasedimentary and metaplutonic rocks of the Labradorian Orogen, deformed by the Grenvillian orogenic cycle (Hocq, 1994). All of these geological elements were reworked during the Grenvillian orogeny between 1160 Ma and 950 Ma.

The Allochthonous Monocyclic Belt comprises allochthonous terrains that underwent a single orogenic cycle. In the western part of the Grenville, the Allochthonous Monocyclic Belt is composed of the Morin and Mont-Laurier terranes, and in the eastern part, of the Wakeham Terrane. These terranes consist mainly of supracrustal rocks intruded by mafic and ultramafic dikes and sills, anorthositic suites (Morin Complex), and granitoids.

The Allochthonous Polycyclic Belt represents the part of the Grenville that was tectonized during an orogenic cycle predating the Grenvillian orogeny. The Allochthonous Polycyclic Belt was juxtaposed with the Parautochthonous Belt during the Grenvillian orogeny (from 1100 to 950 Ma). The east-central part of the Allochthonous Polycyclic Belt has been broadly subdivided into tectonic terrains and domains, which were juxtaposed during the Pinwarian orogeny (from 1550 to 1450 Ma). These terrains include supracrustal or meta-igneous gneissic complexes, anorthositic suites, and several generations of granitic and mafic plutonic rocks. The main magmatic episodes were: mafic and felsic magmatism from 1550 to 1450 Ma and from 1380 to 1350 Ma; dominantly granitic magmatism from 1350 to 1200 Ma; magmatism that generated anorthositic plutonic suites between 1400 and 1000 Ma; and late Grenvillian felsic magmatism from 1000 to 950 Ma. In the immediate vicinity of Sept-Îles, Grenvillian rocks are intruded by the Eocambrian (565 Ma) Sept-Îles Layered Igneous Complex. Farther east, in the Baie des Moutons area, an Eocambrian syenite complex intrudes Grenvillian bedrock.

In 2002, $4.73 million were invested in off-minesite exploration in the Grenville Province, slightly less than in 2001 ($4.8 million). The number of exploration projects also decreased in 2002 relative to 2001 (100 compared to 113 in 2001), due partly to fewer projects in the western part of the Grenville. The **Fonds régional d'exploration minière de la Côte-Nord** funded 14 advanced prospecting projects and 15 grassroots prospecting projects for an amount of $240,000 (Table 1E-1). The **Fonds d'exploration minérale du Saguenay – Lac-Saint-Jean** supported 21 grassroots prospecting projects and 14 advanced prospecting projects totalling nearly $200,000 (Table 1E-1). In the western part of the Grenville, under the Québec Mineral Exploration Program for resource-based MRC, **Géologie Québec** funded 7 grassroots and 5 advanced prospecting projects, along with one project under component B for companies in the Témiscamingue region, for a total of about $128,000 (Table 1E-1). In the eastern part of the Grenville, under the Québec Mineral Exploration Assistance Program, **Géologie Québec** funded 4 projects under component B (exploration companies) for an amount of $160,567 (Table 1E-1).

In the following two sections, the most significant exploration projects undertaken in the Grenville Province in 2002 will be described according to the type of deposit under investigation. The first section deals with the western part of the Grenville Province (which includes the Outaouais, Laurentides, Lanaudière, Mauricie, Portneuf, Québec, Charlevoix, and Saguenay – Lac-Saint-Jean regions), whereas the second focuses on the eastern Grenville (the entire North Shore region).

Western Part of the Grenville Province

In 2002, **Géologie Québec** carried out a new mapping survey at 1:50,000 scale in the Lac Duplessis area (NTS sheet 31O/06), located in the western part of the Grenville Province, northeast of Mont-Laurier (Nantel *et al.*, 2002). This survey aimed to assess the potential of the area for SEDEX-type zinc deposits, industrial minerals, and dimension stone. To conclude a mapping program conducted from 1998 to 2001, **Géologie Québec** produced a geological synthesis of map sheet 22E (Hébert *et al.*, 2002), which covers a considerable portion of the Lac-Saint-Jean anorthositic Suite.

In the western part of the Grenville Province, $1.53 million were invested in off-minesite exploration in 2002, which represents a significant drop in exploration expenditures relative to the $2.4 million invested in 2001. This decrease is attributed to the economic conditions in 2002, which were marked by depressed copper and zinc prices. The number of projects also declined, from 64 in 2001 to 44 in 2002.

MAGMATIC Ni-Cu (-Co-PGE) DEPOSITS

The western part of the Grenville Province contains many anorthositic massifs and several generations of mafic dikes, plutons, and complexes, which contribute to an excellent potential for magmatic Ni-Cu (-Co-PGE) deposits. Prospective areas appear to be associated with major regional structures that serve as terrane boundaries, or that traverse anorthositic complexes or follow their margins. Mineralization also occurs in association with peridotite bodies intruding small anorthositic complexes and in pyroxenite dikes injected into peridotite or amphibolite stocks (Clark and Hébert, 1998a and 1998b).

Virginia Gold Mines and **SOQUEM Inc.** continued their investigations in the Chute-des-Passes area (NTS sheets 22E/14 and 15), located 140 km north of Chicoutimi in the northeastern part of the Lac-Saint-Jean anorthositic Suite (project 31, Figure 1E-1). In this area, the suite is composed of anorthosite, leucogabbro, leucotroctolite, olivine gabbro, and pyroxenite, which intrude a sequence of mixed gneisses. The two companies are searching for magmatic sulphide deposits located at the base of the intrusive complex or in its feeder conduits. A drill program conducted in 2000 revealed a series of locally brecciated, cm- to m-scale, massive to semi-massive sulphide lenses within a layered sequence. The best intersections from the "MHY" zone were: 1.15 % Ni, 0.56 % Cu, and 0.15 % Co over 4.5 m, and 0.84 % Ni, 0.50 % Cu, and 0.10 % Co over 10.15 m. Other drillholes testing the Houlière and Duhamel zones yielded assays of 0.92 % Ni, 0.40 % Cu, and 0.08 % Co over 2.66 m, and 1.27 % Ni, 0.24 % Cu, and 0.12 % Co over 3.0 m, respectively. In 2002, **SOQUEM Inc.** and **Virginia Gold Mines** conducted a deep-penetration electromagnetic (EM) survey, a ground gravity survey, prospecting, and sampling in areas characterized by positive magnetic anomalies.

In 2002, **Virginia Gold Mines** and partner **BHP Billiton** (project 1, Table 1E-1) pursued a geological reconnaissance and prospecting program in several areas of the Grenville Province, in the search for Ni-Cu-PGE deposits. Several sectors, characterized by troctolitic rocks that coincide with EM-Mag anomalies, were judged to have potential for Cu-Ni-Co mineralization.

SEDIMENTARY EXHALATIVE (SEDEX) AND VOLCANOGENIC (VMS) Cu-Zn-Ag±Au, Zn-Pb, AND Cu-Au-Ag DEPOSITS

Southwestern Québec is underlain largely by units of the Grenville Supergroup, which comprises mainly calcitic and dolomitic marbles, aluminous paragneisses, quartzites, and calc-silicate rocks. This sequence hosts the former Balmat mine, located in New York State (U.S.A.), which produced 35 million tonnes of ore at a grade of 9.4 % Zn and 0.5 % Pb. South of Mont-Laurier, zinc occurrences are associated with calc-silicate bands and dolomitic marbles intercalated with thick, calcitic marble horizons.

In the Québec City area, syngenetic, polymetallic, exhalative deposits occur at Montauban, in the Allochthonous Monocyclic Belt. The Montauban Group, which hosts the deposits, consists of a sedimentary, pelitic sequence and mafic to felsic volcanic horizons. From 1983 to 1989, the Muscocho deposit produced 2.8 tonnes of gold and 14.4 tonnes of silver from the North, South, and Marcor zones.

In the Mauricie region, in the west-central part of the Grenville Province, remnants of Archean volcano-sedimentary belts occur in the Parautochthonous Belt. At Langlade, trenches exposed a copper-rich horizon. Exploration conducted in 2000 by **Southern Africa Minerals** and **Explorateurs Innovateurs** led to the discovery of a m-scale horizon of volcanogenic sulphides, which was traced over a lateral distance of more than 50 m. The mineralized zone is hosted by a phlogopite-garnet gneiss, which contains variable amounts of sulphides, gedrite, sillimanite, hercynite, cordierite, and magnetite. In 2000, grades of 0.7 % Cu and 24 g/t Ag were obtained from this zone, which is associated with an EM conductor. On the same property, another horizon yielded up to 5 % Cu and 16 % Zn. Drillholes testing this zone intersected 6.5 m at a grade of 1.5 % Zn and 1.5 % Cu, and 1.0 m at 9.3 % Zn and 5.5 % Cu.

SKARN Cu-W, Cu-Ag, AND Cu-Mo-W DEPOSITS

Noranda Inc. and **SOQUEM Inc.** (project 7, Figure 1E-1) pursued their investigations in map sheets 31O/03 and 31O/06 (Gatineau project). In 2002, the two companies completed four drillholes totalling 416 m, 5 induced polarization surveys covering 85.5 line kilometres, 3 soil geochemistry surveys, regional prospecting, and line cutting. Disseminated and semi-massive copper mineralizations were discovered in association with Cu-Mo-W skarns.

MAGMATIC, VANADIUM-RICH, TITANIFEROUS MAGNETITE AND APATITE DEPOSITS

In the area northeast of Chicoutimi, several Ni-Cu showings and ilmenite, apatite, and titaniferous magnetite occurrences are associated with the Saint-Fulgence lobe of the Lac-Saint-Jean anorthositic Suite. Prospector **Gaétan Tremblay** (project 41, Figure 1E-1) conducted work in the Rivière Saint-Louis area (NTS 22D/15, Garreau Township), following the discovery of an Fe-Ti-V showing with grades of 21.36 % TiO_2 and 0.52 % V_2O_5. The zone consists of massive oxide horizons (titaniferous magnetite with ilmenite) in anorthosite. **Mr. Tremblay** also worked on his Saint-Onge-de-Farraud phase 2 project (project 40, Figure 1E-1). He discovered two showings, one hosted in gabbroic rock within massive anorthosite of the Lac-Saint-Jean anorthositic Suite, and the second at the contact between gabbroic and anorthositic units. Grab samples yielded grades of 4.84 to 7.49 % TiO_2 and 2.25 to 4.83 % P_2O_5 at the first showing, and 4.52 to 21.81 % TiO_2 and 0.6 to 0.31 % P_2O_5 at the second showing.

Ressources d'Arianne Inc. (project 14, Figure 1E-1) carried out sampling programs on many of its properties, which include several former ilmenite producers in the Laurentides, Charlevoix, and Saguenay – Lac-Saint-Jean regions. In 2001, the company conducted diamond drilling, stripping, and a magnetometer survey on the Mirepoix property, where ilmenite and apatite occurrences are associated with massive magnetite horizons. Results included: 4.14 % TiO_2 and 2.74 % P_2O_5 over 25 m; 6.2 % TiO_2 and 3.4 % P_2O_5 over 11 m; 8.11 % TiO_2 over 29.19 m; and 13.8 % TiO_2 over 15.9 m.

NIOBIUM DEPOSITS

The Saint-Honoré Carbonatite in the Saguenay – Lac-Saint-Jean region hosts a niobium deposit mined by **Mazarin Inc.** and **Cambior Inc.** (project 38, Figure 1E-1). Ore from the Niobec mine consists of pyrochlore, which is converted into ferroniobium. Following a profitability study to evaluate a possible mill expansion at the Niobec mine, an initial investment estimated at $7 million resulted in a 20 % increase in production during the third quarter of 2000. The second phase of expansion, which will require an additional investment of $3 million, will result in a gradual increase in production of another 20 %, in order to meet worldwide demand for niobium. The Niobec mine is the only niobium producer in North America and the third largest producer in the world. The mine opened in 1976 and initially produced a niobium pentoxide concentrate (Nb_2O_5). In 1994, following the construction of a converter, the mine started producing ferroniobium. Total output for 2001 reached 3,006 tonnes of niobium.

On the Crevier property, in Crevier and Lagorce townships, **Cambior Inc.** (project 19, Figure 1E-1) conducted prospecting work, completed 33 drillholes totalling 6,050 m, and extracted a sample of 105 metric tonnes for metallurgical tests. Reserves at the Crevier deposit are estimated at 33 million tonnes at a grade of 0.08 % Nb_2O_5 and 201 ppm Ta (0.02 % Ta). The deposit contains two different types of mineralization hosted in a pegmatitic, nepheline syenite: U-Nb-Ta in uranpyrochlore and Nb-Ta in pyrochlore.

Eastern Part of the Grenville Province

The North Shore region occupies the eastern part of the Grenville Province. In 2002, in this area, nearly $3.11 million (compared to $2.5 million in 2001) were invested in off-minesite exploration. In 2002, about 5,054 m (compared to 10,541 m in 2001) were drilled off-minesite. The greater investments in 2002 relative to 2001 were due mainly to the work carried out by **Ressources Appalaches** on their many projects.

As in 2001, exploration in 2002 focused on the search for copper, nickel and platinum group element (PGE) deposits. The area southwest of the Manicouagan Reservoir (Manic 5) was in the spotlight in 2002, thanks to a Ni-Cu-Pd discovery by **Exploration Esbec Inc.** and a graphite discovery by prospector **Phil Boudrias**, whose property has been optioned by **Quinto Technology**.

MAGMATIC Ni-Cu (-Co-PGE) DEPOSITS

Cu-Ni-Co showings in the eastern Grenville may be divided into four types: 1) occurrences associated with ultramafic layers within anorthositic suites; 2) occurrences associated with mafic to ultramafic dikes and sills in metamorphosed mafic complexes; 3) occurrences associated with late tectonic gabbro dikes; and 4) occurrences of the three previous types, remobilized by deformation and metamorphism.

Since 1999, **Falconbridge Ltd.** has been exploring the Manicouagan Plateau area. The company is searching for Ni-Cu-PGE mineralization associated with ultramafic and mafic intrusions cutting metagabbros and paragneisses of the Hart-Jaune Terrane. **Rockwell Ventures Inc.**, a subsidiary of **Hunter Dickinson Group Inc.**, may acquire a 60 % interest in the Haut Plateau project from **Falconbridge Ltd.** by investing $10 million in exploration from 2001 to 2006. In 2002, the company invested $960,000 in geophysical surveys and 7 drillholes (totalling 1,771 m) on the Barre-de-fer showing (project 45, Figure 1E-1). This work confirmed the presence of Ni-Cu-Co mineralization, in the form of disseminated sulphides and massive sulphide breccia veins, over a distance of more than 200 m. Copper-nickel sulphide zones are hosted in rocks of the Manicouagan Metamorphic Complex, composed of gabbro, orthogneiss, and paragneiss cut by gabbroic, ultramafic, and anorthositic bands.

In the Manic 5 area, **Exploration Esbec Inc.** (project 46, Figure 1E-1) discovered a showing (Baie Nickel) with interesting Ni-Cu-Pd grades. The showing consists of disseminated and massive sulphides (chalcopyrite, pyrite and pyrrhotite) in leucogabbro. Assays from four grab samples ranged from 1.41 to 1.65 % Ni, 0.06 to 3.07 % Cu, and 0.87 to 1.23 g/t Pd. Recalculated to 100 % sulphides, these values indicate that the composition of the sulphides reaches 2.23 % Ni, 3.86 % Cu, and 1.94 g/t Pd.

In 2002, **Ressources Appalaches** was very active in the eastern Grenville Province. It continued exploration on the B-20 (project 47, Figure 1E-1) and Baie-des-Sables properties, held in partnership with **Marum Resources**. SIROTEM geophysical surveys, prospecting, and 22 drillholes totalling 4,532 m were carried out on the B-20 property. On this property, located in the Rivière-Pentecôte anorthositic Suite, disseminated, semi-massive, and massive sulphide mineralization, composed of pyrrhotite, chalcopyrite, pentlandite, and local pyrite, occurs near units of pyroxenite or melanorite. Sulphides are also disseminated locally in the anorthosite and the leuconoritic country rocks. Massive sulphides form horizons or pods ranging from a few tens of centimetres to more than two metres thick. The main ore zones are found along the border of the Rivière-Pentecôte anorthositic Suite, less than 2 km from the contact with metamorphosed, supracrustal rocks. **Ressources Appalaches** and **Marum Resources** reported promising results from a drill campaign on the Inco Grid, on the B-20 property. Mineralized horizons up to 10 m thick, including massive sulphide zones with up to 1.2 % Ni, 1.6 % Cu, 0.13 % Co, and 0.4 g/t Pt, were reported. On the Main Grid, located on the same property, four out of eight drillholes intersected nine mineralized zones, from 4 to 65 m thick, containing massive sulphides and yielding grades up to 1.6 % Ni, 1.5 % Cu, 0.18 % Co, and 0.2 g/t Pt. Drillhole F02-21 intersected several massive and disseminated sulphide horizons from a depth of 38 m down to 115 m. Assay results indicate continuous Ni-Cu-Co grades over 77 m. This interval includes two distinct zones grading, respectively, 0.72 % and 0.53 % equivalent Ni over 8 m. Based on these results, drillhole F02-21 was deepened in the mineralized pyroxenite (over a vertical depth of 126 m). The additional mineralization intersected in this drillhole confirms that the thick massive sulphide horizons observed on surface continue at depth. The deeper section of the drillhole (from 115 to 182 metres) is even higher grade and contains two significant intervals, including 10.5 m at 0.75 % Ni and 0.57 % Cu, and 18 m at 0.57 % Ni and 0.47 % Cu. According to **Ressources Appalaches**, these drill results confirm that the B-20 property hosts an important Ni-Cu system located near surface, with significant cobalt and platinum group element concentrations. In December 2002, **Ressources Appalaches** and **Marum Resources** conducted downhole and ground geophysical surveys on the B-20 property, using **Lamontagne Géophysique**'s UTEM electromagnetic method, to detect additional Ni-Cu massive sulphides. Geophysical modelling will allow the two companies to delineate known mineralized zones more accurately and orient subsequent work programs in 2003 more effectively.

Northwest of the B-20 property, prospectors **Roberge Bouffard** and **Claude Gauthier** (project 48, Figure 1E-1) reported grades of up to 0.19 % Ni and 0.25 % Cu from grab samples collected in a pyroxenite at the gabbronorite/anorthosite contact in the Rivière-Pentecôte anorthositic Suite. The setting is similar to that reported on the B-20 property.

The Baie-des-Sables property, held by **Ressources Appalaches** and **Marum Resources**, contains Cu-Ni-Co occurrences associated with pyroxenite horizons, lenses, and pods located along the northern margin of the Rivière-Pentecôte anorthositic Suite (project 49, Figure 1E-1). Disseminated (droplets) and net-textured sulphides (pyrrhotite, pyrite, and chalcopyrite), as well as small massive sulphide pods, are hosted in pyroxenite and, more rarely, in leuconorite. This property was acquired in 2001 following the discovery of a surface showing from which a massive sulphide sample yielded 3.9 g/t Pt, 2.3 g/t Au, 1.5 % Cu, and 0.16 % Ni. In 2002, three drillholes totalling 522 m were completed on the property.

In August 2002, **Ressources Appalaches** concluded an agreement with **Fancamp Exploration Ltd.** to acquire a 50 % interest in the Lac Méchant Ni-Cu-Co property, located northeast of Sept-Îles (project 50, Figure 1E-1); the agreement included a commitment to spend $400,000 in exploration over 5 years. In 1997, **Kennecott Canada** intersected low Cu-Ni-Co grades associated with a gabbroic complex and mineralized paragneiss in this area. Subsequently, an extensive soil geochemistry survey detected major anomalies covering several hundred metres. In 1998, **Fancamp Exploration Ltd.** obtained grades reaching 3 % Cu, 1.3 % Ni, 0.01 % Co, and 0.8 g/t Au from surface samples. In 2002, **Ressources Appalaches** invested $45,000 in exploration on this project. The work program consisted of geological mapping of the intrusion, lithogeochemistry sampling, reinterpretation of the airborne survey performed by **Kennecott Canada**, ground geophysics, and drilling. East of Natashquan, in a previously unexplored area (project 51, Figure 1E-1), **Ressources Appalaches** discovered two Pd-Cu showings. Grades of up to 1.6 g/t Pd+Pt and 1.5 % Cu were obtained from grab samples.

Southeast of the Manicouagan Reservoir, just east of Petit Lac Garemand (project 53, Figure 1E-1), **SOQUEM Inc.** in partnership with **Ressources Appalaches** carried out stripping, prospecting, and sampling on EM anomalies, in the search for magmatic Cu-Ni-Pt-Pd mineralization.

Cuesta Geoscience Ltd. conducted a reconnaissance program, including field visits and sampling of several showings, on their property near Manitou Lake (project 54, Figure 1E-1). The showings occur along the border of the Havre-Saint-Pierre anorthositic Suite, at the contact with quartz-feldspar-biotite-hornblende±pyroxene gneisses of the Manitou Complex. These are magmatic Ni-Cu-Co±PGE-type occurrences.

Bitterroot Resources Ltd. launched an exploration program covering a vast area between Mistassini Lake (NTS 22M and 22L) and the Manicouagan Reservoir (NTS 22N, project 55, Figure 1E-1). Activities included prospecting, magnetic surveys, regional heavy mineral and rock sampling programs, whole rock analyses, and assays. The company is searching for both Ni-Cu-PGE mineralization and diamonds. They were able to target five areas of interest for investigation in 2003.

A general reconnaissance project covering the entire Grenville Province was undertaken by **Virginia Gold Mines** and **BHP Billiton** (project 1, Table 1E-1). The two partners visited several ultramafic intrusions hosting magmatic Ni-Cu±PGE mineralization. Activities to date include prospecting and sampling. The two companies also investigated the David Lake area (project 56, Figure 1E-1). Ground geophysics, mapping, and stripping led to the discovery of a few PGE showings (up to 4 g/t PGE) in an ultramafic intrusion hosting disseminated sulphides.

Cu-REE (-U) DEPOSITS

In the Manitou Lake, Bigot Lake, and Marmont Lake areas (projects 57, 58, and 59, Figure 1E-1), **SOQUEM Inc.** and partner **COGEMA Resources Inc.** conducted prospecting work, geological follow-ups, and drill core examinations. They also carried out a ground radiometric and spectrometer survey. In the Manitou Lake and Marmont Lake areas, the purpose of this work was to determine the extent of magnetitite horizons hosting copper sulphides and rare earth element (REE) minerals. **COGEMA Resources Inc.** also carried out exploration in the search for uranium.

IRON FORMATIONS

The Fermont area is characterized by the presence of numerous iron deposits. These deposits occur in metamorphosed iron formations of the Gagnon Group, which are Grenvillian metamorphic equivalents of iron formations in the Labrador Trough. Extracted minerals are hematite and specular hematite. These deposits have been mined since the 1950s by the **Québec Cartier Mining Company**, in Québec, and by **IOC** and **Wabush Mines**, in Labrador. In 2002, the Québec Cartier Mining Company did not conduct exploration. It mainly carried out drill core studies and sampling on its Mount Wright property (project 60, Figure 1E-1).

MAGMATIC MASSIVE ILMENITE DEPOSITS

Anorthositic suites in the North Shore region are known for their ilmenite and titaniferous magnetite deposits. **QIT-Fer et Titane**, a wholly-owned subsidiary of the Anglo-Australian group **Rio Tinto**, is one of the largest mining companies in the world. Since 1950, this company has run an open pit operation to extract ilmenite at the Lac Tio mine (project 61; Figure 1E-1), near Havre-Saint-Pierre. It also operates a metallurgical complex at Sorel-Tracy, where the ore is processed to produce titanium dioxide, pig iron, and high-quality steel. The Lac Tio ilmenite deposit is the second largest in the world, with proven reserves of 75 million tonnes at an average grade of 86.9 % combined iron and titanium oxide (34.2 % TiO_2, 27.5 % FeO, 25.2 % Fe_2O_3, 4.3 % SiO_2, 3.5 % Al_2O_3, 3.1 % MgO, 0.9 % CaO, 0.1 % Cr_2O_3, and 0.41 % V_2O_5). In 2002, **QIT-Fer et Titane** explored some 40 claims in the vicinity of the Lac Tio mine and another 70 claims in the Gros Diable Lake area (Big Island; projects 61 and 62, Figure 1E-1). Geological mapping and sampling were conducted in these areas. Ground magnetometer and gravity surveys as well as core drilling were carried out to test targets in the vicinity of the Lac Tio mine. In the Mingan area (project 63, Figure 1E-1), **QIT-Fer et Titane** conducted drilling and sand sampling on 191 claims.

Ressources d'Arianne Inc. is currently studying the polymetallic character of titanium deposits associated with Grenvillian anorthosites. During the year, it conducted reconnaissance mapping and collected samples for a polished thin section study in the Havre-Saint-Pierre (26 claims, project 64, Figure 1E-1), Manitou River (16 claims, project 65, Figure 1E-1), and De La Blache Lake (22 claims, project 66, Figure 1E-1) areas, characterized by grades of 20.5 % TiO_2 and 0.36 % V_2O_5. Mapping focused on several iron-titanium deposits (Fe, Ti, P, Cu, Co, etc.) located within or along the borders of anorthositic complexes such as the Havre-Saint-Pierre anorthositic Suite. Metallurgical tests are scheduled for 2003.

Opportunities for Exploration

The Grenville Province hosts a number of mineral occurrences with Ni-Cu, Fe-Ti, Cu, Cu-Zn, Zn-Pb, and Cu-Au, as well as a few examples of Fe-Cu-REE mineralization. However, several areas in the Grenville Province provide great opportunities for Ni-Cu-PGE exploration, given the proximity to infrastructure in certain regions. Clark (1998) published an overview of the Ni-Cu potential of the Grenville Province in Québec and, in 2001, another document dealing with the distribution and potential of platinum group elements in Québec, including the Grenville Province (Clark, 2001). In terms of exploration for Ni-Cu and Ni-Cu-PGE deposits, several factors must be taken into consideration. The search for economic Ni-Cu±Co±PGE deposits should target magmatic settings that favour a sufficient enrichment of metallic sulphides (Ni, Cu, Co). These environments must also allow the accumulation of great volumes of sulphides. Exploration should focus on dynamic magmatic systems characterized by abundant flow of magma (conditions that favour mixing of sulphide and silicate liquids) and on entry points into magmatic chambers (Clark, 1998). Magmatic systems associated with crustal-scale fractures or major faults that transect sulphide-rich metasedimentary sequences are the most favourable for the emplacement of copper-nickel mineralization. For PGE-enriched environments, it has been suggested that areas of the mantle depleted by a previous partial melting episode may, when melted a second time, generate titanium-depleted but relatively PGE-enriched magmas (see Clark, 1998).

In the western part of the Grenville Province, other than Cu-Ni occurrences associated with anorthositic suites, the La Bostonnais area, between La Tuque and the Grand Lac Bostonnais (31P/16) is a prospective area for Ni-Cu deposits, and perhaps even for PGE mineralization. In the Lac Édouard area (31P/09), the Lac Édouard mine (160,000 tonnes at 1.5 % Ni and 0.5 % Cu) was in production briefly from 1973 to 1974, producing 374,550 kg of Ni and 154,360 kg of Cu. The southern part of the La Bostonnais Complex is formed of calc-alkalic, dioritic to granitic intrusive rocks. In the northern part of the complex, several metagabbro bands are associated with the dioritic rocks. In the Grand Lac Bostonnais area, very little exploration has been conducted on these bands. The La Bostonnais Complex is also intruded by several gabbro and gabbronorite bodies, as well as minor pyroxenite and peridotite. The Lapeyrère, Lac Édouard, and Lac à l'Étoile gabbroic intrusions represent important volumes of mafic magma emplaced in the La Bostonnais Complex. Ultramafic bands are also associated with these mafic intrusions. The Lac à l'Étoile gabbro (northern part of 31P/09 and southern part of 31P/16) has seen very little exploration for Ni-Cu and PGE deposits. A thorough field program as well as an airborne Mag-EM geophysical survey are good starting points to assess the Ni-Cu-PGE potential of this part of the Grenville.

In the eastern part of the Grenville Province (NTS sheets 12L and 12M), metagabbros of the Liliane and Robe Noire suites warrant detailed sampling for elements such as Ni, Cu, and PGE and constitute a target that should not be overlooked. Verpaelst *et al.* (1999) has already mentioned the Robe Noire mafic Suite as a potential host for Cu-Au-Ag-V occurrences. This style of mineralization is accompanied by magnetite and ilmenite and occurs near metasediments.

The Baie-Comeau area offers excellent targets for mineral exploration. The recent discovery of the Baie Nickel showing (Ni-Cu-Pd) southwest of Manic 5 by prospector Philias Boudrias (**Exploration Esbec**) has prompted us to re-examine this sector (NTS 22K/13, 14, and 15; 22N/02, 03, and 04). Strong aeromagnetic anomalies are present in the area, in addition to a series of very favourable host rocks (anorthosite, gabbro, norite, and paragneiss). Exploration focused on the Ni-Cu, PGE, graphite, and iron in this area should be facilitated by the development of new logging roads.

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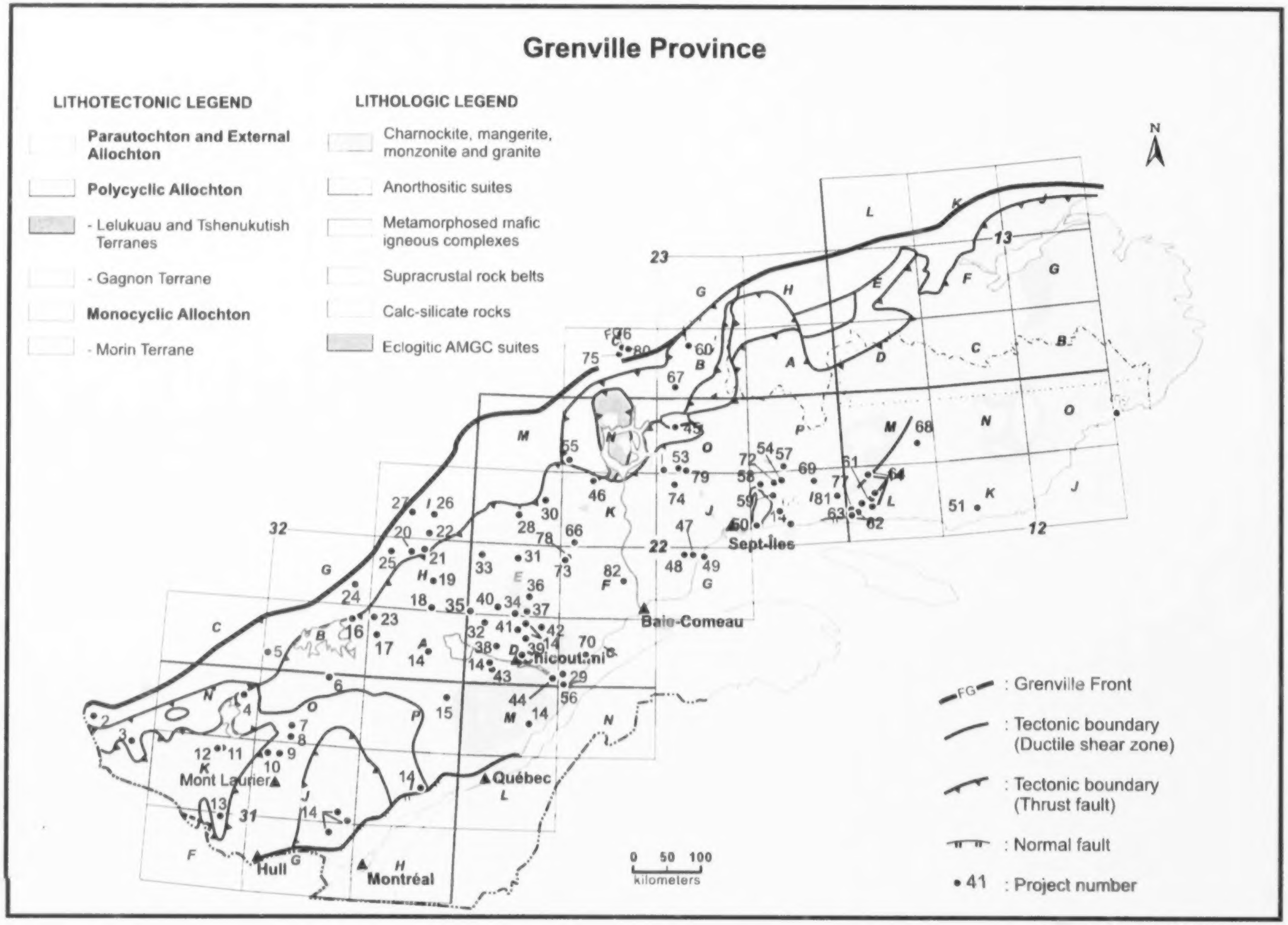
Grenville Province
LITHOTECTONIC LEGEND
Parautochton and External Allochton
Polycyclic Allochton
- Lelukuau and Tshenukutish Terranes
- Gagnon Terrane
Monocyclic Allochton
- Morin Terrane
LITHOLOGIC LEGEND
Charnockite, mangerite, monzonite and granite
Anorthositic suites
Metamorphosed mafic igneous complexes
Supracrustal rock belts
Calc-silicate rocks
Eclogitic AMGC suites
N
FG : Grenville Front
: Tectonic boundary (Ductile shear zone)
: Tectonic boundary (Thrust fault)
: Normal fault
• 41 : Project number
0 50 100
kilometers
Sept-Iles
Baie-Comeau
Chicoutimi
Québec
Montréal
Hull
Mont Laurier
32
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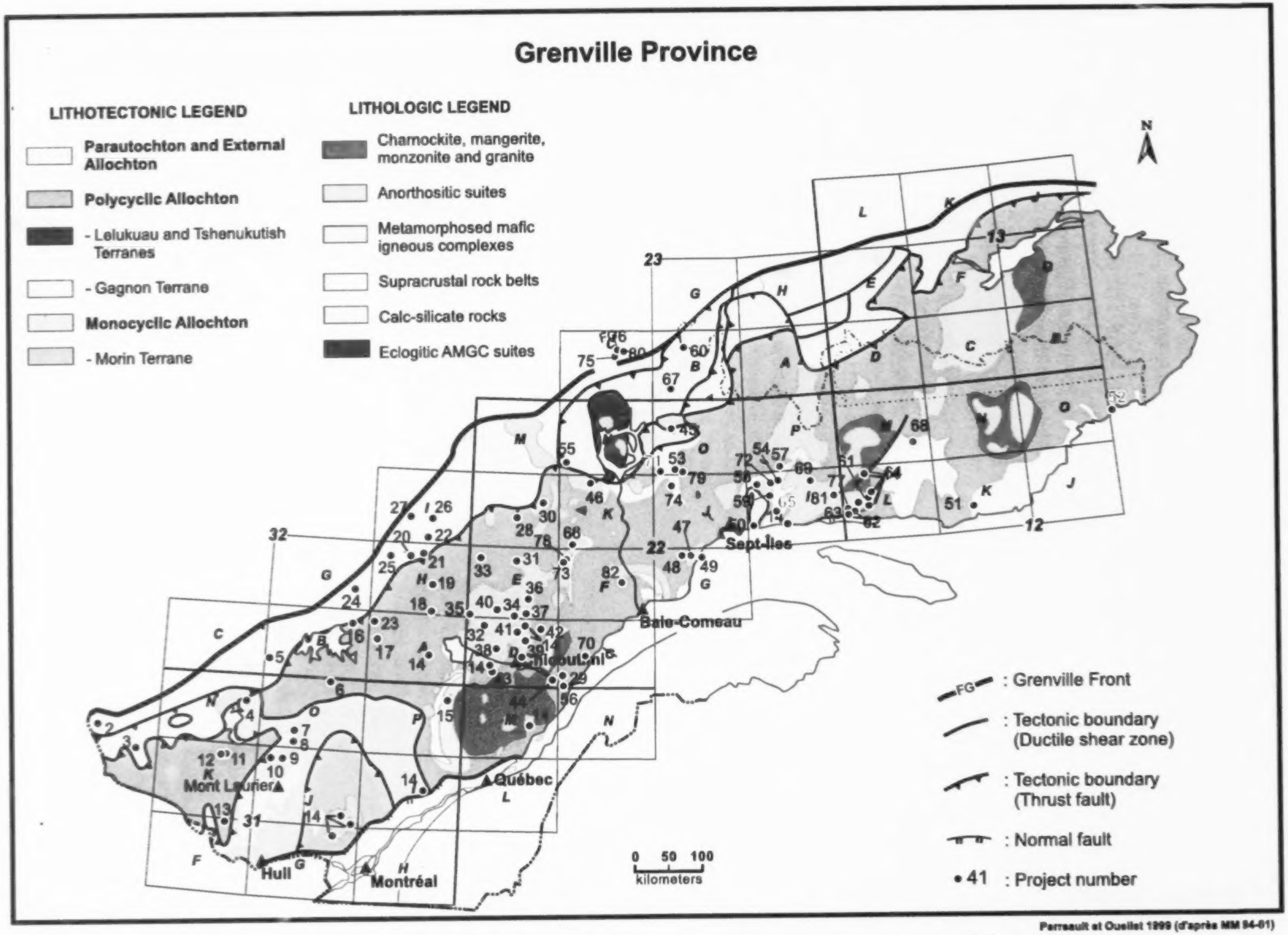
Perreault et Ouellet 1999 (d'après MM 94-01)

Figure 1E-1. Location of mining exploration projects in the Grenville Province for 2002.


Grenville Province
LITHOTECTONIC LEGEND
Parautochton and External Allochton
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: Tectonic boundary (Ductile shear zone)
: Tectonic boundary (Thrust fault)
: Normal fault
• 41 : Project number

Parreault et Ouellet 1999 (d'après MM 94-01)

Figure 1E-1. Location of mining exploration projects in the Grenville Province for 2002.

TABLE 1E-1 - Exploration projects in the Grenville Province for 2002.

No	TOWNSHIP	Fig.	NTS	COMPAGNY / PROSPECTOR	PROJECT	SUBSTANCE	WORK $^{(1)}$
1		1E-1	21M, 22D, 22F, 22N, 23C, 31O, 31N	Virginia Gold Mines inc./BHP Billiton	Reconnaissance Grenville	Cu-Ni-Co	Pr, G, GpA (Mag-EM)
2	Shehyn, Mazenod	1E-1	31M/03	Kinbauri Gold Corporation	Laniel	Cu-Ni-Co-PGE	Pr, G
3	Booth, McLachlim, Senezegues, Villedieu	1E-1	31L/15, 16	André Gauthier, Marioara Panait	Kiksaboo	Zn-Pb-Au-Ag	Pr
4		1E-1	31N/08, 09	Exploration Esbec	Réservoir Cabonga	Cu-Ni-Co-PGE-Au-Ag-Zn	Pr, Gp
5	Vasson	1E-1	32B/05	Richard Roy, Antoine Fournier	Serpent	diamond	Pr
6	Tassé et Bazin	1E-1	32B/02, 31O/15	Pierre Beaulieu	Tassé-Bazin	Cu-Ni-Co-PGE	Pr, Gc(ro)
7		1E-1	31O/03, 06	Noranda inc./SOQUEM INC.	Gatineau	Cu-Ni-W	Pr, G, E, PP, Mag-EM, Gc(s), S(4:416)
8	Chopin	1E-1	31O/03	Michel Belisle et Suzanne Melançon	Vastel Ouest - 2	Cu-W-Au	Pr
9	Major	1E-1	31J/13	Réal Dumoulin	Major	Cu-Ni-Co-Ag	Pr
10		1E-1	31J/13, 14	Omégalpha inc.	Baskatong	U-W-Nb-Ta	Pr, Gp
11	Hainaut	1E-1	31K/15	André Gauthier	Vulcain-A2	Ag-Au	Pr
12	Hainaut	1E-1	31K/15	Jacques Duval	Hainaut	Au-Ag	Pr
13		1E-1	31F/15, 31K/02	Jean Philippe	Lac Bell	Au-Ag-PGE-Ni-Cr	Pr, Gp
14	Beresford, Wexford, Shawinigan, Kénogami, Garreau	1E-1	31G/15, 16, 31J/01, 02, 31I/10, 21M/09, 10, 22D/06, 10, 15, 32A/07	Les Ressources d'Arianne inc.	Ti-2002	Fe-Ti-V-Cu-Ni	E, Et
15	Gendron	1E-1	31P/09, 16	Gervais Simard et Robert Gagnon	Lac à l'Étoile	Ni-Cu-PGE	Pr
16	Huard	1E-1	32B/16	Jean-Louis Tremblay, Éric Gervais	Huard	Au-Cu-Zn	Pr
17	Meilleur	1E-1	32A/12	Nicolas Lavoie, Martin Néron	Wabano II	Zn-Cu-Au	Pr
18	Crevier	1E-1	32H/02	Gervais Simard, Robert Gagnon	Beaudet	Nb-Ta-U	Pr
19	Crevier, Lagorce	1E-1	32H/07, 10	Cambior inc.	Crevier	Nb-Ta	G, E, Mag-EM, Rad,TM, S(33:6050)
20	Lanaudière	1E-1	32H/14	Fonds d'exploration minière du Saguenay - Lac Saint-Jean	Or Ouasiemsca II	Au	Pr
21	Dupré	1E-1	32H/15	Bernard Sénéchal, Michael Dion	Stravinski 1	Zn-Cu-Au	Pr
22	Lanaudière	1E-1	32I/02	Gaston Savard, Gaétan Blaquière	Lac des Cygnes	Cu-Au	Pr
23		1E-1	32A/13	Paul Gagnon	Contact Nord-Ouest	Mo-Cu	Pr
24	Rohault	1E-1	32G/08	Bersmans Lavoie, Michel Desbiens	Indice BDL	Cu-Zn-Au	Pr
25	Jumonville	1E-1	32H/13	Claude D'Amours	Nestaocaono-2002	Cu-Zn-Au	Pr

TABLE 1E-1 - Exploration projects in the Grenville Province for 2002.

No	TOWNSHIP	Fig.	NTS	COMPAGNY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [1]
26		1E-1	32I/06	Fonds d'exploration minière du Saguenay - Lac Saint-Jean	Camp Claverie	Cu-Zn-Pb-Ag	Pr, Gp
27		1E-1	32I/07	Fonds d'exploration minière du Saguenay - Lac Saint-Jean	RX Mafique	Ni-Cu-PGE	Pr, Gp
28		1E-1	22L/02	Bruno Boily	Péri-Bruno	Ni-Cu	Pr
29	Pontbriand, Dumas	1E-1	22C/04	Patrick Tremblay	Périboncas / Saint-Étienne	Ti-Zn	Pr
30		1E-1	22L/09	Fonds d'exploration minière du Saguenay - Lac Saint-Jean	Hélicoptère 2002	Ni-Cu	Pr
31		1E-1	22E/14, 15	SOQUEM INC./Mines d'Or Virginia inc.	Chute-des-Passes	Cu-Ni-Co-Ti-P	G, E, S(?:?), Gp
32	Lidice	1E-1	22D/13	André Rinfret, Roland Dallaire	Mixtionnite	Ni-Cu-Co	Pr
33		1E-1	22E/13	Lionel Lefebvre	Lac du Sapin Croche	Zn-Cu-Mo	Pr
34		1E-1	22E/08	Enrick Tremblay, Jérôme Lavoie	Lac Rond	Ni-Cu-Mo-Ag	Pr
35	Hudon	1E-1	22E/04	Paul Gagnon	Hudon Zinc phase 3	Zn-Cu-Au	Pr
36		1E-1	22E/02	Charles Boivin	Lac Ross	Cu-Zn-Mo	Pr
37		1E-1	22E/02	Marcel St-Laurent, Paul Gagnon	Maria-Chapdelaine	Ni-Cu-Ti-P	Pr
38	*Simard*	1E-1	*22D/11*	*Mazarin inc./Cambior inc.*	*Niobec (BM 663)*	*Nb*	*S*
39	St-Germain	1E-1	22D/07	Martin Truchon	Lac Caribou	Zn-Cu	Pr
40	St-Onge de Farraud	1E-1	22E/03	Gaétan Tremblay	St-Onge-de-Farraud	V	Pr
41	De Garraud	1E-1	22D/15	Gaétan Tremblay	Vanadium Phase 3	V	Pr
42		1E-1	22D/16	Léopold Tremblay	Molybdénite Monts Valin	Mo	Pr
43	Lartigue	1E-1	22D/06	Lucien Girouard, André St-Georges	Lucand	Ni-Cu-PGE	Pr
44	Dumas	1E-1	22D/01	André Liboiron	Petit-Saguenay	diamond	Pr
45	Cormier, Villeray, Forgues, Le Courtois, Nadeau, Chevé	1E-1	22O/10,11,12,14	Rockwell Ventures Inc./Falconbridge Ltd	Haut plateau (Barre de fer)	Ni-Co-Cu	Gp, S(7:1771m)
46	Guinecourt	1E-1	22K/14	Exploration Esbec Inc.	Baie Nickel	Ni-Cu-Pd	VLF, Pr, G, T, E
47	Grenier	1E-1	22G/14	Ressources Appalaches Inc./Marum Resources Ltd	B-20	Ni-Cu-Co-Pt-Pd	Gp (sirotem), S(22:4532m)
48		1E-1	22G/14	Roberge Bouffard, Claude Gauthier	Lac en coude	Ni-Cu-Co-Pt-Au	T, E, Pr
49	Grenier	1E-1	22G/15	Ressources Appalaches Inc./Marum Resources Ltd	Baie des sables	Ni-Cu-Co-Pt	S(3:522m)

TABLE 1E-1 - Exploration projects in the Grenville Province for 2002.

No	TOWNSHIP	Fig.	NTS	COMPAGNY / PROSPECTOR	PROJECT	SUBSTANCE	WORK [(1)]
50	Moisie	1E-1	22I/05	Ressources Appalaches Inc./Fancamp Exploration Ltd	Lac méchant	Ni-Cu	Pr, E
51	Musquaro, Bisset	1E-1	12K/06, 11, 14	Ressources Appalaches Inc.	Musquaro	Ni-Cu-Pt-Pd	G, Pr, Gp, E
52		1E-1	12P/12	Marum Resources Ltd	Nepetipi	Ni-Cu-PGE	Pr
53		1E-1	22O/03	SOQUEM INC./Ressources Appalaches Inc.	EM Côte-Nord	Ni-Cu-Pt-Pd	Pr, E
54		1E-1	22I/14	Cuesta Geoscience Ltd	Lac Manitou	Ni-Cu-Co-PGE	Pr, E
55		1E-1	22N, *22M, 22L*	Bitterroot Resources Ltd	Mistassini	Ni-Cu-PGE-diamond	Pr, Gp, E
56		1E-1	22C/04	Virginia Gold Mines inc./BHP Billiton	Lac David	PGE	T, Gp, G
57		1E-1	22P/03	SOQUEM INC.	Manitou	Cu-rare earths	Pr, Gp, G
58		1E-1	22I/13	SOQUEM INC./Cogema Inc.	Lac Bigot	U	Pr, G
59		1E-1	22I/11,14	SOQUEM INC./Cogema Inc.	Lac Marmont	Cu-rare earths	Pr, E, G
60	Normanville	1E-1	23B/14	Québec Cartier Mining	Mont-Wright	Fe	
61	Parker	1E-1	12L/11	QIT Fer & Titane Inc.	Mine Tio	Fe-Ti	G, E, S
62	Cugnet	1E-1	12L/05	QIT Fer & Titane Inc.	Lac Gros Diable	Fe-Ti	G, E, S
63	Mingan	1E-1	23I/08	QIT Fer & Titane Inc./Rio Tinto Fer & Titane	Mingan	Fe-Ti	E, S
64	Puyjalon	1E-1	12L/11	Ressources d'Arianne Inc.	Havre-St-Pierre	Fe-Ti	E, G
65		1E-1	22I/11	Ressources d'Arianne Inc.	Rivière Manitou	Cu-Zn-Pb-Fe	E, G
66		1E-1	22K/04	Ressources d'Arianne Inc.	Lac La Blache	Ti-V	E, G
67		1E-1	23B/04	Anglo American Exploration Ltd	Grenville Zn-Gagnon	Zn-Pb	
68		1E-1	12M/08	Jean Laforest	M-12	Au	Pr
69		1E-1	22I/15, 16	André Chênevert	Otter III	Ni-Cu-Cr-Pt-Co	Pr
70	Iberville	1E-1	22C/11	Rosaire Soucy, Jocelyne Tremblay	Ruisseau des Cèdres	Ni-Cu-Zn-Pb-Au	E
71		1E-1	22O/04	Bernard Poirier, Michel Dionne	Rivière Toulnustouc Nord	Ni-Cu-Co-Zn	Pr
72		1E-1	22I/14	Carmen Pelletier, Maurice Morissette	Lac Lloyd	Ni-Cu	Pr
73		1E-1	22F/13	Carol Soucy, Pierre Brisson	Soubris 2	Ni-Cu-Pt-Zn	Pr
74		1E-1	22J/14	Claude Ouellet, Robert Ouellet	Phantôme	Ni-Cu-Co-Zn	Pr
75		1E-1	23C/10	Jean Fortin	Courcy A. 1-2002	Cu-Au	Pr
76		1E-1	23C/10	André Lefebvre, Normand Goulet	Tatou	Au	
77	Cugnet	1E-1	12L/05	Daniel Scherrer, Mario Picard		Ilmenite	E, T
78		1E-1	22F/13	Jacques Dionne, André Dionne, Richard Lanthier	La Blanche Boily 2002	Ni-Cu-Co-Zn-Au-PGE	T
79		1E-1	22O/03	Claude Ouellet, Robert Ouellet	Amiral II	Ni-Cu-Co-Zn-Pb	E
80		1E-1	23C/10	Jean Fortin	Courcy A. 2-2002	Cu-Au	Pr
81		1E-1	22I/09	Michel Vaillancourt	Lac Girard	Ni-Cu-Zn-PGE	Pr
82		1E-1	22F/10	Jacques Ferland	Lac Robot	Magnetite, ilmenite	Pr
83		1E-1	22C/04	Germain Otis	GEM.O 001	Cu-Au-Ag	E

EXPLORATION WORK LEGEND

E	Sampling	Gp	Undefined geophysical survey
EF	Feasibility or market study	GpA	Airborne geophysical survey
EM	Electromagnetic survey	Int. Sat.	Satellite image interpretation
ET	Technical evaluation study	Mag	Magnetic survey
Ev	Bulk sampling	DPEM	Drillhole pulse electromagnetic survey
G	Geological survey	PP	Induced polarization survey
Gc	Undefined geochemical survey	Pr	Prospecting
Gc(h)	Humus geochemical survey	S(nb:m)	Diamond drilling (number:total metres)
Gc(l)	Lake bottom geochemical survey	Sci	Reverse circulation drilling
Gc(ro)	Rock geochemical survey	T	Trenching and stripping
Gc(ru)	Stream geochemical survey	TBF	VLF electromagnetic survey
Gc(s)	Soil geochemical survey	TM	Metallurgical testing
Gc(t)	Till geochemical survey	*italic*	Underground exploration work
		bold	Advanced-stage project
		▨	MRN subsidized project

St. Lawrence Platform and Appalachians

Serge Lachance

Introduction

The St. Lawrence Platform and Appalachians, as discussed in this section, includes all parts of Québec located south of the St. Lawrence River (Figure 1F-1). The geological setting of this part of Québec, located south of the Canadian Shield, consists of Paleozoic rocks subdivided into two geological provinces: the St. Lawrence Platform, which unconformably overlies the Grenvillian basement (erosional unconformity), and the Appalachians to the southeast. The boundary between the two provinces is marked by Logan's Line (LL). In Québec, each of these two provinces is subdivided into major tectonostratigraphic domains. The St. Lawrence Platform, from northwest to southeast, is made up of the two Cambrian to Silurian domains: the Autochthonous Domain and the Parautochthonous Domain. The Appalachian Orogen, also from northwest to southeast, is divided into four domains: the Cambro-Ordovician Humber zone (thrust sheet domain) and Dunnage zone (oceanic domain) separated by the Baie Verte-Brompton Line (BVBL), the Siluro-Devonian Gaspé Belt, and the Permo-Carboniferous Magdalen Basin, which unconformably overlies the other Paleozoic rocks (erosional unconformity).

With regards to exploration activities in the St. Lawrence Platform and Appalachians, a total of 62 projects were tabulated in 2002, compared to 100 for the year 2001. These 62 projects required investments of $2.14 million, compared to $2.75 million the previous year. For 2002, the total number of metres drilled was 3,637 m whereas this number stood at 10,855 m in 2001.

To provide a better framework in which to discuss exploration projects, the St. Lawrence Platform and Appalachians area is divided into three sectors: the Southwestern sector (Montréal and Chaudière-Appalaches regions), the Central sector (Bas-Saint-Laurent region), and the Northeastern sector (Gaspésie and Îles-de-la-Madeleine regions). Therefore, if we break down the number of projects, the amount of investments and the number of metres drilled for each sector, we have, for the Southwestern sector, 25 projects totalling $0.35 million and 240 m drilled; for the Central sector, 13 projects totalling $0.31 million and 371 m drilled; and for the Northeastern sector, 24 projects totalling $1.48 million and 3,026 m drilled.

For the year 2002, within the scope of the Québec Mineral Exploration Assistance Program, the Ministère des Ressources naturelles (MRN) allocated $750,000 for this area. This amount was given to the three regional exploration funds, namely the **Fonds d'exploration minérale Estrie/Chaudière-Appalaches (FEMECA)**, the **Fonds d'exploration minière du Bas-Saint-Laurent (FEMBSL)** and the **Fonds régional d'assistance à la prospection minière de la Gaspésie et des Îles-de-la-Madeleine (FRAPMGÎM)**. This amount of $750,000 is included in the total investment figure ($2.14 million) mentioned above.

Exploration Projects

This chapter lists and describes the exploration projects that attracted our attention over the course of 2002. The reader is referred to Figure 1F-1 and Table 1F-1 for the location and a brief description of all projects. Two projects, not accounted for among the 62 projects listed in Table 1F-1 and which did not involve exploration work per se, reached important milestones in 2002, namely **Niocan Inc.**'s ferroniobium project and **Allican Resources Inc.**'s ferrochrome project.

SOUTHWESTERN SECTOR (MONTRÉAL – CHAUDIÈRE-APPALACHES)

Near Montréal, in the Lac-des-Deux-Montagnes seigniory, **Niocan Inc**. continued development of its niobium mining property, located in the Oka carbonatite Complex. The company's project involves an underground mining operation and the onsite construction of a processing plant to convert pyrochlore concentrate into ferroniobium. An additional long-term objective is to extract and sell by-products associated with the niobium ore deposit, namely apatite, magnetite, mica, rare earths, and calcite. To date, only the niobium market has been taken into account and the economic viability of two ore zones has been established (zones "S-60" and "HWM-2"). The main zone "S-60", a 200 by 100-metre pipe-shaped endoskarn, contains an identified mineral resource of 14.37 million tonnes at a grade of 0.66 % Nb_20_5. As for "HWM-2", an ore zone over 600 m long by 25 m thick, it contains a resource of 5.95 million tonnes at a grade of 0.56 % Nb_20_5. The combined ore reserves of these two zones (recoverable reserves with a cut-off grade of 0.50 % Nb_2O_5) are estimated at 13.3 million tonnes at a grade of 0.63 % Nb_20_5.

Since 1999, **Niocan** has successfully completed all the steps leading up to production, namely basic engineering studies, market studies, and environmental impact studies as well as optimization work and land acquisition. In July 2000, the Ministère des Ressources naturelles du Québec granted a mining lease and approved the company's proposed sites for mine infrastructure and tailings disposal in 2001. Furthermore, in 2001, the Commission de protection du territoire agricole du Québec approved its request concerning the use of farmland for its mining project. In an inquiry report released in late October 2002, the Bureau d'audiences publiques sur l'environnement concluded that the operation of a niobium mine will have little impact on the environment and public health. The Tribunal administratif du Québec, initially scheduled to rule in late November 2002 concerning an appeal of the decision to rezone farmlands made by the Commission de protection du territoire agricole du Québec, called for additional information from company management and from the project's opponents. Additional engineering tests and other types of studies are required from **Niocan** in order to receive the Certificate of Authorization delivered by the Ministère de l'Environnement du Québec.

Allican Resources Inc. focussed its efforts on a project to build and operate a processing plant to produce an estimated 20,000 tonnes per year of low-carbon ferrochrome from chromite concentrate. The mining company reviewed certain project parameters such as : the definitive location of the project, optimization of the production process, and the output capacity. The company's initial plan was to build the plant near Thetford Mines in the Chaudière-Appalaches region and process imported concentrate as well as ore from local sources derived from potential mining operations at the Hall (open pit) and Reed-Bélanger (underground mine) chromite deposits in the Thetford Mines ophiolitic Complex. Mineral resources delineated to date at the Hall deposit stand at 1.02 million tonnes at a grade of 4.6 % Cr_2O_3 and an average grade of 0.22 g/t Pt. At the Reed-Bélanger deposit, resources are estimated at 5.6 million tonnes at a grade of 6.78 % Cr_2O_3. According to **Allican Resources**, the Hall and Reed-Bélanger chrome deposits do not meet certain requirements to act as supply sources for the future plant.

In September 2002, the company management announced its decision, based on economic factors, to eliminate three of the five potential sites, namely the Bécancour, Sorel-Tracy, and Thetford Mines areas. It is currently evaluating other potentially favourable sites (in the Côte-Nord, Gaspésie, and Bas-Saint-Laurent regions) to implement its project. **Allican** has postponed until 2003 its exploration programs initially scheduled for 2002 on all its mining properties located in the Thetford Mines ophiolitic Complex and the Asbestos Ophiolite.

The **Fonds d'exploration minérale Estrie/Chaudière-Appalaches** (FEMECA) carried out various projects in the search for precious metals, base metals, and rare earths in the following areas: Bolton Township (Bolton project, no.1), Patton Township (Patton project, no.13 and Appolline project, no. 14), Leeds Township (Kinnear's Mill project, no.10), and the Saint-François seigniory (Veilleux project, no.17, and Kilgour 2002, no.18). Some of these projects were conducted in partnership with **J. Bernard** (project no.10), **J. Leboeuf** and **P. Millaire** (project no.14), and **R. Mainville** (projects no.17 and 18). This work took place in a variety of geological settings: Orford ophiolitic Complex, tuff and gold-bearing quartz stockwork in the Beauceville Formation (Magog Group), Sutton Schists and Tibbit Hill Formation. On the Veilleux project, tuffs and a rusty zone injected with quartz host massive arsenopyrite. Assay samples returned grades from 1.82 to 2.33 g/t Au. Results are pending for the other projects.

Over the last five years, **C. Royer** has discovered (thanks to grants by the Fonds d'exploration minérale Estrie/Chaudière-Appalaches) a quartz vein with polymetallic (Zn-Pb-Cu-Bi-Ag) massive sulphides on the Étoile d'Or property (project no.7) in Ditton Township, near La Patrie in the Estrie region. On the property, several quartz veins 1 to 6 m wide are injected in blackish clayslates and sandstones of the Compton Formation (Saint-François Group). A short drillhole (55 m) completed in the fall of 2001, following a preliminary drillhole completed in March of the same year, intersected 0.8 m at 3 % Zn. In previous years, grades of 505 g/t Ag, 0.5 % Cu, 1.8 % Pb, 7.5 % Zn, and 1.7 % Bi were also obtained from surface samples. In 2002, following a magnetometer survey, mineralized quartz veins 2 to 25 cm wide located in a stream 300 m from the main showing were stripped and sampled and returned grades of 0.35 % Zn and 0.10 % Bi.

CENTRAL SECTOR (BAS-SAINT-LAURENT)

The **Fonds d'exploration minière du Bas-Saint-Laurent** carried out regional exploration for base metal targets throughout the entire Bas-Saint-Laurent region (project no.28). It also assessed the gold, copper, lead, and zinc potential on its properties located in the following townships: Joffre and Faribault (Shickshock Sud project, no.34); Cuoq, Le Clercq, Boutet, and La Grange (Rivière Matane project, no.33); Awantjish, Cabot, and Fleuriau (Faille Neigette project, no.27); Cabano and Estcourt (Rivière Bleue project, no.29); and Catalogne and Gravier (Rivière Nouvelle project, no.30).

The fund is seeking partnership agreements with mining exploration companies to assess the potential of the Shickshock Sud and Rivière Matane properties, both now at a fairly advanced exploration phase. The two properties are located along the Shickshock-Sud fault and are underlain by the Saint-Léon Formation (Chaleurs Group). N-S lineaments transect both the formation and the regional fault. Previous work identified the presence of copper-bearing dolomite veins in N-S fractures within the Saint-Léon Formation.

Exploration work, including trenching and four drillholes totalling 222 m, was completed in 2002 by **H. Rioux** (HER project, no.38), east of Mont Anaclet, in the Rimouski seigniory. The work was carried out in order to determine the mineral potential of geochemical anomalies detected in 1999 and geophysical anomalies identified in 2001 in Cambrian-Ordovician sandstones and mudrocks (Trois-Pistoles Group). Results were inconclusive, except for one assay of 28.5 g/t Ag reported at a depth of 31 m in drillhole no.4. Mineralized surface samples collected in 1998 by Noranda in the vicinity of the HER property yielded assay results of 0.12 to 0.26 % Cu, 1.36 to 7.46 % Pb, and 1.6 to 11.0 g/t Ag.

NORTHEASTERN SECTOR (GASPÉSIE – ÎLES-DE-LA-MADELEINE)

Ressources Appalaches Inc. was very active in the north-central part of the Gaspésie region, with two drill campaigns, one on the Mont-de-l'Aigle property (project no.48) in Lemieux Township (12 drillholes totalling 2,100 m) and the second on the Lesseps property (project no.49) in Lesseps and Lemieux townships (2 drillholes totalling 420 m). It also conducted various types of work in partnership with **SOQUEM Inc.** and **Major Drilling Int.** on the Lesseps-Barter property (project no.50) in Lesseps Township.

In the fall of 2002, **Ressources Appalaches Inc.** commissioned a THEM helicopter-borne geophysical survey covering a total surface area of 300 square kilometres, including the Mont-de-l'Aigle, Lesseps, and Lesseps-Barter properties, as well as a detailed gravity survey covering 10 square kilometres in the Lemieux Dome area (Mont-de-l'Aigle property).

The first four drillholes (no. F02-01 to F02-04) completed on the Mont-de-l'Aigle property, near the Pardiac showing, intersected 50 m of mineralized breccia, down to a depth of 210 m. Based on a visual estimate, this breccia contains between 10 and 90 % hematite and assays indicate several copper-rich sections, including a 10.45-m interval with up to 1 % Cu (drillhole F02-01). In late November 2002, the company announced the discovery of six new iron oxide-copper-gold zones at Mont-de-l'Aigle. Assay results from ten grab samples returned grades of 0.13 to 1.9 % Cu, 0.1 to 0.7 g/t Au, and 1.4 to 75 g/t Ag. One of these zones has been traced over a lateral distance of 900 m.

In a metallogenic setting similar to that observed on the Lesseps and Lesseps-Barter properties, joint venture partners **SOQUEM Inc.** and **Noranda Inc.** have been exploring for many years the Vallières property (project no.51) in Lesseps Township, in the search for copper-rich skarns and massive sulphides (mantos) in carbonate rocks of the Chaleurs Group and the Upper Gaspé Limestones. A THEM helicopter-borne geophysical survey was conducted on the property in the fall 2002.

The Lac Arsenault property (project no.62), held by **Scorpio Mining Corp.,** is located in Weir and Honorat townships. It is characterized by at least five polymetallic (Au-Ag-Pb-Zn) vein showings. These veins were emplaced in greywackes and siltstones of the Arsenault Formation (Honorat Group), along the southern limb of the Grand Pabos fault. In 1975, probable resources on this property were estimated at 40,000 tonnes at a grade of 15.4 g/t Au, 197 g/t Ag, 6.60 % Pb, and 3.50 % Zn. According to the company, a more recent compilation (1996) of previous work produced a new resource estimate of 220,043 tonnes at a grade of 10.6 g/t Au, not taking into account the silver, lead, and zinc content. Work conducted by the company in 2000 and 2001 (the 2001 program was funded in part by the Québec Mineral Exploration Assistance Program, component B) defined the gold potential of five distinct ore zones. Channel sampling produced the following results: for the Baker vein, 14.4 g/t Au, 470.66 g/t Ag, 14.27 % Pb, and 0.36 % Zn over 41.5 m along strike; for the Marleau vein, 4.11 g/t Au and 4.11 g/t Ag over 131 m along strike; for the Marleau breccia zone (partially exposed), 3.08 g/t Au over 8.08 m in width; and for the Mersereau vein, 8.57 g/t Au, 165.57 g/t Ag, 6.19 % Pb, and 0.23 % Zn over 70 m along strike. Assay results from four bulk samples extracted from a new vein, dubbed the "Blue Vein", range from 3.70 to 20.77 g/t Au, 14.74 to 98.73 g/t Ag, 1.01 to 5.76 % Pb, and from 0.04 to 12.77 % Zn. During the year 2002, **Scorpio Mining Corp.** continued its exploration program on the Lac Arsenault East property, with mapping, a soil geochemistry survey as well as an EM-Mag survey.

A group of prospectors (in training) and geologists worked on several off-claim targets (project no.42) for the **Fonds régional d'assistance à la prospection minière de la Gaspésie et des Îles-de-la-Madeleine.** Three ore deposit models, namely MVT, lead-zinc SEDEX, and gold-listwaenite, were specifically targeted in the eastern Gaspésie region (Gaspé, Port-Daniel, and Murdochville areas) and the New Richmond area. A new copper showing (0.7 % Cu), two new silver showings (15 and 19 g/t Ag) associated with iron-rich organic black shales, gaspeite found in dolomitized serpentine, indications of hydrothermal alteration zones (Ba, Mn, Fe, Pb, Si) in sandstones of the York River Formation in the Gaspé Sandstone Group (SEDEX potential), and several anomalous areas (Ba, Ag and Hg) are among the highlights and discoveries of this project in 2002.

In Weir Township, prospectors **R. Fulham** and **S. Lebrasseur** discovered a Cu±Au showing in a new sector of their property (Mt-Castle project, no.61), which has been the focus of exploration since the discovery, in 2001, of a gold showing (980 ppb Au) in quartz-pyrite veins cross-cutting quartzite and conglomerate. The new zone consists of a 2 to 3-metre wide copper-rich breccia (chalcopyrite-malachite) open in two directions (N330° and N150°) hosted in talc-chlorite-epidote-amphibole schists. A grab sample graded 1.62 % Cu, 2.3 g/t Ag, 51 ppb Au, and 32 ppb Pd, whereas channel samples yielded 0.51 % Cu, 1.1 g/t Ag, and 95 ppb Au over 1.9 metres.

Mine-Triangle-d'Argent R. D., the **FRAPMGÎM**, and prospectors **J.-B. Beaudin** and **L. Leblanc** joined forces in 2002 to assess the Triangle d'argent Cu-Ag showing (project no.59) in Vondenvelden Township. Mapping, prospecting, trenching, and sampling were carried out on the property, along with a drill program (8 drillholes totalling 506 m) to test to a depth of about 100 m the copper zone (5.5 % Cu over 12 m) previously discovered on surface by prospectors Beaudin and Leblanc. Results are pending.

Prospectors **J.-B. Beaudin** and **L. Leblanc** also continued investigations undertaken in 2001 on the Grand-Pabos North property (project no.56) in Randin Township. Work conducted in 2001 led to the discovery of a copper-silver showing (1.0 to 7.2 % Cu and 1.2 to 28.6 g/t Ag) consisting of disseminated chalcopyrite and bornite in undeformed volcanic conglomerates cross-cut by quartz veins. The 2002 exploration campaign confirmed the 2001 discovery and uncovered new copper-rich zones.

Opportunities for Exploration

Paleozoic sedimentary and volcanic assemblages in north-central Gaspésie, particularly in the area between Murdochville to the east and the Lemieux Dome, 60 km further west (NTS sheets 22A/11 to 14, 22B/09 and 16, 22G/01 and 22H/04), still remain prime targets for mineral exploration in this segment of the Appalachians in eastern Québec.

Given its metallogenic potential, highlighted by the abundance of intrusions and hydrothermal alteration zones, the mining history of this region has been marked, since the early sixties, by extensive exploration campaigns. These have lead to several discoveries, namely the Madeleine copper-silver mine, the Sullipek copper prospect, and a number of base metal and precious metal showings.

Despite all this activity, vast expanses in north-central Gaspésie still remain very poorly explored, due to the forest cover, the paucity of outcrops, and difficult access. The logging industry has recently developed a good network of roads that allows access to several logging sites in different locations which, in turn, makes it much easier to investigate the numerous outcrops cleared during the construction of these roads.

Base Metals and Precious Metals

The Murdochville area is known for the former mining operations (1955-1999) of Noranda Inc., centred on world-class porphyry-type copper deposits (Copper Mountain), skarns (Zones B and C), and marble-hosted replacement massive sulphides (mantos) (Zone E). From 1955 to the final day of operation on October 14, 1999 (due to depletion of mineable reserves), the various orebodies at Mines Gaspé produced 142 million tonnes of ore. Some 2.8 million tonnes of copper anodes were poured at the Gaspé copper smelter from ten million tonnes of concentrate, supplied from the mine and from imported ore, between 1955 and the date of closure on April 27, 2002.

Exploration in north-central Gaspésie, to date, has almost exclusively focused on the search for these types of deposits associated with porphyry intrusions. Distal polymetallic vein deposits, which, on a regional scale, show a typical lateral and vertical metal zoning pattern, from Fe-Cu-rich in the centre of the system to Cu±Zn±Pb±W and Zn±Pb±Ag around the periphery, have also been targeted.

However, based on the presence of prospective metallogenic environments (Pilote, 2002; Doyon, 1995, 1996; Bellehumeur and Valiquette, 1993; Wares, 1988; Stevens, 1983), north-central Gaspésie also represents a regional target for certain types of ore deposits that were neglected up until now, namely those occurring around the periphery or atop porphyry systems and at the subvolcanic to volcanic level. Future exploration in this area may lead to the discovery of zinc-lead-silver replacement deposits (skarns and massive sulphides) in limestones, epithermal gold deposits in and around rhyolitic volcanic centres (particularly the Mont Lyall and Mont Tuzo rhyolites peripheral to the Lemieux Dome), SEDEX-type lead-zinc-silver-barite exhalative deposits associated with manganese-enriched zones in calcareous shales with bentonite beds indicating volcanism coeval with sedimentation in the Upper Gaspé Limestones, volcanogenic massive sulphide (VMS) zinc-lead-copper or Besshi-type copper-zinc deposits, and disseminated lead-zinc in sandstones of the York River Formation around the southern margin of the Lemieux Dome.

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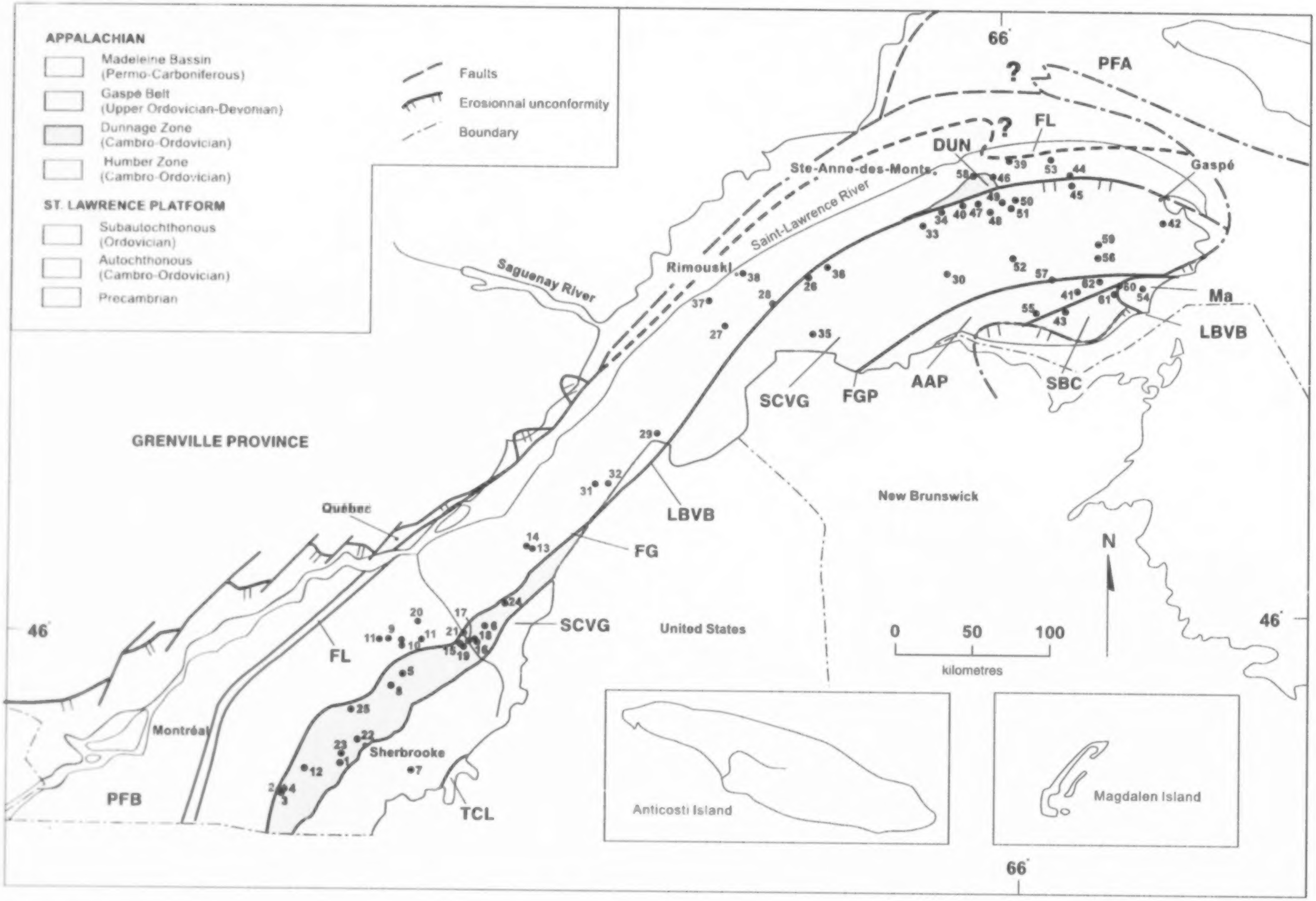
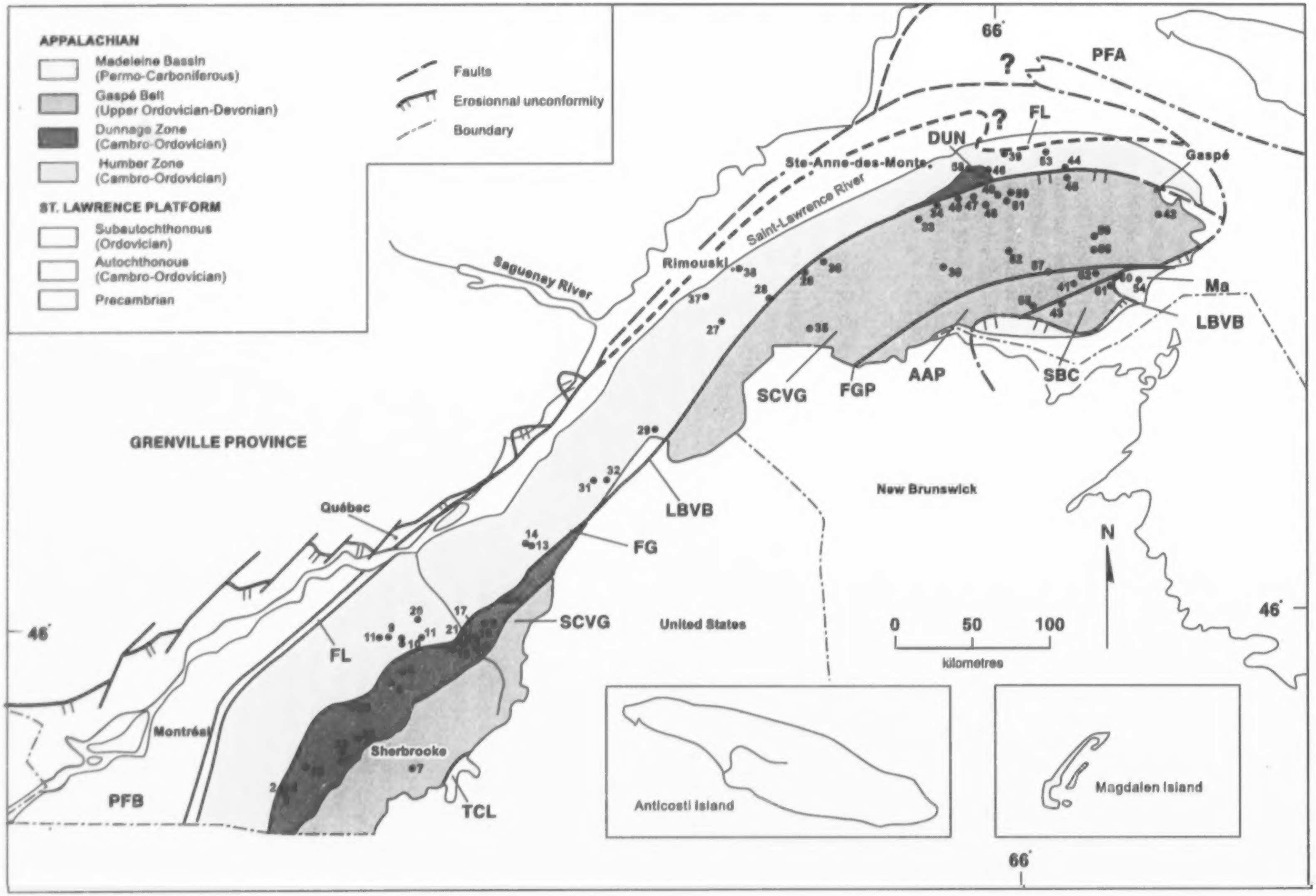

APPALACHIAN
Madeleine Bassin (Permo-Carboniferous)
Gaspé Belt (Upper Ordovician-Devonian)
Dunnage Zone (Cambro-Ordovician)
Humber Zone (Cambro-Ordovician)
ST. LAWRENCE PLATFORM
Subautochthonous (Ordovician)
Autochthonous (Cambro-Ordovician)
Precambrian
Faults
Erosionnal unconformity
Boundary
GRENVILLE PROVINCE
Saguenay River
Saint-Lawrence River
Rimouski
Ste-Anne-des-Monts
Gaspé
Québec
Montréal
Sherbrooke
New Brunswick
United States
PFA
PFB
FL
DUN
LBVB
FG
SCVG
FGP
AAP
SBC
Ma
TCL
66°
46°
N
0
50
100
kilometres
Anticosti Island
Magdalen Island

Figure 1F-1. Location of exploration work in 2002, total of 62 projects (no 1 to 62)

Abbreviations : **AAP** : Aroostook-Percé anticlinorium; **DUN** : Dunnage zone; **FGP** : Grand Pabos fault; **FL** : Logan fault; **FG** : Guadeloupe fault; **LBVB** : Baie Verte-Brompton line; **Ma** : Maquereau-Mictaw window; **PFA** : Anticosti platform; **PFB** : St. Lawrence Lowlands platform; **SBC** : Baie des Chaleurs synclinorium; **SCVG** : Connecticut Valley - Gaspé synclinorium; **TCL** : Chain Lakes terrane.


APPALACHIAN
Madeleine Bassin (Permo-Carboniferous)
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ST. LAWRENCE PLATFORM
Subautochthonous (Ordovician)
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Precambrian
Faults
Erosionnal unconformity
Boundary
GRENVILLE PROVINCE
Saguenay River
Saint-Lawrence River
Rimouski
Ste-Anne-des-Monts
Gaspé
Québec
Montréal
Sherbrooke
New Brunswick
United States
Anticosti Island
Magdalen Island
PFA
PFB
FL
DUN
FG
LBVB
SCVG
FGP
AAP
SBC
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TCL
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TABLE 1F-1 - Exploration work over the St. Lawrence Platform and the Appalachia territory in 2002.

N°	TOWNSHIP (SEIGNIORY)	FIG.	NTS	COMPANY/PROSPECTOR	PROJECT	SUBSTANCES	WORK [1]
SOUTH-WEST SECTOR (MONTRÉAL/CHAUDIÈRE - APPALACHIA AREA)							
		1F-1					
1	Ascot et Stoke		21E/05	Venditelli, L.	Gold Ridge	Au-Ag-Cu-Zn	Pr, E, Gc(ro)
2	Bolton		31H/01	Beaudette, R.	Bolton 3	Massive sulfides	Beep Mat, MAX-MIN
3	Bolton		31H/01	FEMECA	Bolton 1	Au	T, E, Gc(ro)
4	Bolton		31H/01	Vincent, P.	Bolton-Constellar	Au-PGE	G, E
5	Coleraine		21E/14	Brassard, B.	NewBert/Coleraine	Au-PGE	G, T, E
6	Cranbourne		21L/07	Gamache, B., Letendre, K.	Lac Etchemin 2002	Au-PGE	Pr, E, Gc(ro)
7	Ditton		21E/06	Royer, C.	Étoile d'or 2002	Au-Ag-Bi-Cu-Pb-Zn	G, Pr, Mag, E, Gc(ro)
8	Garthby		21E/14	Brassard, B.	NewBert/Lac de l'Est	PGE	G, Pr, E
9	Inverness		21L/03	Bernard, J.	Brébeuf	Au	Pr, E, Gc(ru)(s)
10	Leeds		21L/03	Bernard, J., FEMECA	Kennear's Mill	Au-Cu-Zn-rare earths	Pr, E, Gc(ro)
11	Leeds, Broughton, Inverness, Irlande		21L/03-06	Gaucher, E. and P.	St-Fabien - St-Jacques	Au-Cu	G, Pr, Beep Mat, E, Gc(ro)(s)
12	Orford		31H/08	Vincent, P.	Orford Constellar 2002	Au-PGE-Ni-Cu-Co	G, E, Gc(ro)
13	Patton		21L/16	FEMECA	Patton	Au-rare earths	Pr, E, Gc(s)
14	Patton		21L/16	Leboeuf, J., Millaire, P., FEMECA	Appolline	Au-rare earths	G, Levé radiométrique, E, Gc(ro)
15	(St-François)		21L/02	Beaudoin, R., Ouellette, J.	Chute du Bras	Au-PGE	Pr, E, Gc(s)
16	(St-François)		21L/02	Mainville, R.	De Léry	Au	Pr, E, Gc(s)
17	(St-François)		21L/02	Mainville, R., FEMECA	Veilleux	Au	G, T, E, Gc(ro), S(3:60m)
18	(St-François)		21L/02	Mainville, R., FEMECA	Kilgour 2002	Au	Pr, T, E, Gc(ro)
19	(St-François)		21L/02	Ouellette, J.	Du Moulin	Au	Pr, E, S(1:30m)
20	(St-Gilles)		21L/06	Brassard, B.	NewBert/St-Sylvestre	Au-Zn-PGE	G, Pr, Beep Mat, T, E, Gc(ro)
21	(St-Joseph)		21L/07	Venditelli, L., Barta, J., Gartner, J.	St-Joseph	Au-PGE	G, EM
22	Stoke, Dudswell		21E/12	Simonneau, R., Soulière, J.G.	Mt Stoke	Au	Pr, E, Gc(ro)
23	Stoke		21E/12	Venditelli, L.	Stoke	Zn-Cu-Au-Ag	G, E, S(1:150m)
24	Ware		21L/08-09	Ex-In and Mines d'or Virginia	Hors claim	Cu-Zn-Ni-Au	Beep Mat, E
25	Wotton, Ham Nord, Shipton		21E/13	Venditelli, L.	Asbestos	Au-PGE	Pr, Mag, E
CENTRAL SECTOR (LOWER ST. LAWRENCE AREA)							
		1F-1					
26	Awantjish		22B/05	Rioux, H.	Awant	Cu-Zn-Ni-Cr-Co-V-Ti-rare earths	P, E, Gc(s)
27	Awantjish, Cabot, Fleuriau, McNider, Macpès, Neigette, (Lepage), (Rimouski)		22B/05-12, C/08-09	FEMBSL	Faille Neigette	Cu-Au-Zn-Pb	G, Pr
28	Bas-Saint-Laurent		21N-22B-C	FEMBSL	Recherche de cibles	Base metals	Pr
29	Cabano, Estcourt		21N/06-11	FEMBSL	Rivière Bleue	Cu-Au	G, Pr, Gc(s)
30	Catalogne, Gravier		22B/07-08-09-10	FEMBSL	Rivière Nouvelle	Zn-Pb	Pr
31	Chapais		21N/04	Guillot, J.	Ruisseau Ferré 2002	Au-Cu-Pb	Pr
32	Chapais		21N/04	Tourigny, R.	Lac de l'Est	Au-Cu-Pb	Pr, Gc(ru)

TABLE 1F-1 - Exploration work over the St. Lawrence Platform and the Appalachia territory in 2002.

N°	TOWNSHIP (SEIGNIORY)	FIG.	NTS	COMPANY/PROSPECTOR	PROJECT	SUBSTANCES	WORK [1]
33	Cuoq, Le Clerq, Boutet, Lagrange		22B/10-11	FEMBSL	Rivière Matane	Cu-Pb-Zn	G, Pr, T, Gc(s), S(2:61,3m)
34	Joffre, Faribault		22B/15-10-11	FEMBSL	Shickshock-Sud	Cu-Zn	G, Pr, Gc(s), S(4:87.1m)
35	(Lac Mitis)		22B/04	Levesque, J.-Y.	Lac du Gros Ruisseau	Au-Ag-Zn-Pb	Pr
36	Matane, Langis		22B/11-12	Turcotte, R.	Paula	Ag-Pb-Cu-Co	Pr
37	(Nicolas-Rioux)		22C/02	Turcotte, T., Hammond, J.-M.	Lac Petit Rimouski	Au-Cu-Zn-Pb	G, Pr, T, E
38	(Rimouski)		22C/08	Rioux, H.	HER	Cu-Pb-Zn-Ag	G, Pr, T, E, S(4:222m)
NORTH-EAST SECTOR (GASPÉ - MAGDELEN-ISLANDS AREA)							
		1F-1					
39	Duchesnay		22H/04	Gagné, G. and B., Jauvin, D., Gasseau, S.	Petit Lac Cristal	Au	Pr
40	Faribault		22B/16	Pelletier, G., Dumont, A.	Faribault	Ni	Pr
41	Garin		22A/06	Marin J.-M., Lavoie, J.-Y.	Garin	Cu-Mo-Ag	Pr, E, Gc(ro)
42	Gaspésie Est, New Richmond		22A-B-G-H	FRAPMGÎM	Cibles 2002	Pb-Zn-Au-Cu-Ag-Gaspéite	Pr, E, Gc(ro)
43	Hamilton		22A/04	Bernard, F.	Pierre de Lune	Pb-Zn	Pr, E, Gc(ro)
44	Holland		22H/03	Chouinard, M.	Murdoch Nord	Cu-Mo	Pr, E, Gc(ro)
45	Holland		22A/14	Chouinard, Y.	Lac York 2002	Cu-Mo-Pb-Zn	Pr, E, Gc(ro)
46	Lapotardière		22G/01	Marin, J.-M., Lavoie, J.-M.	Tourelle	Au-Cu-Ag-Pb-Zn	Pr
47	Lemieux, Courcelette		22B/16	Gagnon, A.	Lapidaire	Gaspéite	T, E
48	Lemieux		22B/16	Ressources Appalaches inc.	Mont de l'Aigie	Cu-Au-Ag	G, Pr, GpA-THEM, Mag, Levé gravimétrique au sol, T, E, Gc(ro), S(12:2100m)
49	Lesseps		22B/16-A/13	Ressources Appalaches inc.	Lesseps	Cu	GpA-THEM, Mag, S(2:420m)
50	Lesseps		22A/13	Ressources Appalaches inc., SOQUEM INC. and Forages Major Int.	Lesseps-Barter	Cu-Pb-Zn-Ag	GpA-THEM, Mag, Gc(ro)

TABLE 1F-1 - Exploration work over the St. Lawrence Platform and the Appalachia territory in 2002.

N°	TOWNSHIP (SEIGNIORY)	FIG.	NTS	COMPANY/PROSPECTOR	PROJECT	SUBSTANCES	WORK [1]
51	Lesseps		22A/13, B/16	SOQUEM INC. and NORANDA INC.	Vallières	Cu	GpA-THEM, Mag
52	Marcil		22A/12, B/09	Therrien, G., Robinson, O.	Tina	Cu-Pb-Mo-Zn-Au	Pr, E, Gc(ro)
53	(Mont-Louis)		22H/04	Robinson, R., Vallée, A.	Dôme 2002	Au-Pb-Zn-Cu	Pr, E, Gc(ro)
54	Newport		22A/07	Boulanger, B.	Maquereau	Cu-Ag	Pr, E, Gc(ro)
55	New Richmond		22A/04	Roberge, L.	Ruisseau du Cap	Au	Pr, E, Gc(ro)
56	Randin		22A/11	Beaudin, J.-B., Leblanc, L.	Grand Pabos Nord	Cu-Ag	G, Pr, Mag, TBF, PP, T, E, Gc(ro)
57	Robidoux		22A/05	Roberge, L., Bernard, F.	Lac noir	Cu-Au-Pb-Zn	G, Pr, T, E, Gc(ro)
58	Tourelle, Cap-Chat		22G/01	Essiambre, C., F. and H.	Tourelle	Pb-Zn-Au-Ag	Pr
59	Vondenvelden		22A/11	Mine-Triangle d'Argent R. D., FRAMPGIM, Beaudin, J.-B., Leblanc, L.	Triangle d'Argent	Cu-Ag	G, Pr, T, E, Gc(ro), S(8:506m)
60	Weir		22A/06	Beaudin, J.-B., Leblanc, L.	Les portes de l'enfer	Au-Ag-Co-Cu-PGE-Gaspéite	Pr, E, Gc(ro)
61	Weir		22A/06	Fulham, R., Lebrasseur, S.	Mt Castle	Au-Cu	G, T, E, Gc(ro)
62	Weir et Honorat		22A/06	Scorpio Mining Corporation	Lac Arsenault Est	Au-Ag-Cu-Pb-Zn	G, Pr, TBF, Mag, E, Gc(s)

EXPLORATION WORK LEGEND

E	Sampling
EF	Feasibility or market study
EM	Electromagnetic survey
ET	Technical evaluation study
Ev	Bulk sampling
G	Geological survey
Gc	Undefined geochemical survey
Gc(h)	Humus geochemical survey
Gc(l)	Lake bottom geochemical survey
Gc(ro)	Rock geochemical survey
Gc(ru)	Stream geochemical survey
Gc(s)	Soil geochemical survey
Gc(t)	Till geochemical survey

Gp	Undefined geophysical survey
GpA	Airborne geophysical survey
Int. Sat.	Satellite image interpretation
Mag	Magnetic survey
DPEM	Drillhole pulse electromagnetic survey
PP	Induced polarization survey
Pr	Prospecting
S(nb:m)	Diamond drilling (number:total metres)
Sci	Reverse circulation drilling
T	Trenching and stripping
TBF	VLF electromagnetic survey
TM	Metallurgical testing
italic	Underground exploration work
bold	Advanced-stage project
▨	MRN subsidized project

Chapter 2

Construction materials, industrial minerals, and peat moss

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This chapter describes the results of mining activities conducted in Québec over the course of 2002, in the construction materials, industrial minerals and peat industries.

Construction Materials

Yves Bellemare

This section provides a description of exploration and mining activities conducted in the search for, and extraction of, architectural stone, decorative aggregate, and crafting stone. Furthermore, it includes a list of quarries in operation (Appendix, Table II). However, the description of work focused on the search for sand and gravel or crushed stone operations is excluded.

Production

Figure II shows the location of quarries in operation in 2002, and Table II in the appendix provides a brief description of each operation.

A total of 69 active quarries, producing architectural stone from anorthositic, charnockitic and granitic suites (dimension stone), but also quartzite, dolomitic marble and calcitic marble (decorative aggregate), steatite and soapstone (for sculptures and refractory plates), slate (roofing tiles and slabs), as well as limestone, sandstone, schist, and gneiss (ashlar and landscaping stone) were inventoried.

With nine quarries, the Rivière-à-Pierre area (NTS 31I/16 and 31P/01) remains the most important mining camp for the extraction of dimension stone. Three other regions were also active, namely the Saint-Nazaire area (NTS 22D/12), with five quarries, the Stanstead area (NTS 31H/01) with four active quarries, and the Saint-Alexis-des-Monts – Saint-Didace area (NTS 31I/06), with three quarries.

During the year, two new quarries began production operations. In Bois Township, north of Rivière-à-Pierre, **Granite D.R.C.** and **Stone Vogue International** started an exploration and development program which led to the opening of a quarry face (Appendix, Table II, project 32). Conclusive results led to the start-up of operations to extract a coarse-grained, brownish grey porphyritic farsundite of the Rivière-à-Pierre Suite. The stone, destined for the production of dimension stone, is also used to produce landscaping stone, sawn and calibrated slabs and curbstone. It is marketed under the name Canadian Caledonia and is similar to the Deer Brown variety produced by A. Lacroix et Fils Granit. The site is now known as the Boca quarry. In Campeau Township, southeast of the town of Témiscaming, **Les Pierres du Nord**, following development work conducted during the past few years, now extracts green muscovite-bearing quartzite (Appendix, Table II, project 4). The stone is used as a constituent in the production of modified stone products and is sold to Granirex in Thetford Mines. The stone is also used as decorative aggregate and for landscaping.

Worker training in the stone extraction and processing industry in Québec has been a constant preoccupation for industry stakeholders. Two training programs are now available to meet these needs. The **École des métiers de la construction de Montréal** offers a 1,440-hour course focused on stone extraction and cutting techniques. The **Centre de formation Le Granit**, located in Lac Mégantic, offers a professional certificate (DEP) in stone cutting. This training program lasts one year. For more information, please consult the following websites :

http://www.csdm.qc.ca/emcm/fr_progr.htm

http://www.cshauts-cantons.qc.ca/centres/granit/

Exploration

New Reports

Twelve new reports that describe prospecting and development work completed over the last few years were submitted by mining title holders as assessment work reports to the Ministère des Ressources naturelles du Québec. **Glendyne** (Table 2.1, project 2) identified new units of fine-grained slate near its quarry in Notre-Dame-du-Lac-Long.

The Department also published three documents that contain sections describing prospective areas for architectural stone. According to Petryk (2002, page 44), marble limestones assigned to member 3 of the Lime Ridge Formation in the Dudswell area are an attractive target. Specifically, prospects identified for their industrial lime potential may also constitute prime exploration targets for dimension stone (Allen Petryk, personal communication).

In the Lac des Polonais area north of Mont-Laurier, a brownish red, augen-textured or porphyritic monzogranite of the Serpent intrusive Suite has the proper attributes to justify mineral exploration work (Nantel and Pintson, 2002, page 31). In 2001, following the release of preliminary results from the geological mapping survey, this monzogranite was the focus of exploration for its potential as dimension stone.

In the Saint-Jean-Baptiste-Viannay and Amqui areas, assessment work helped define the potential for dimension stone, ashlar, and decorative aggregate of sandstones of the Val-Brillant and Indian Cove formations. In the Saint-Paul-du-Nord area, similar work was undertaken to assess units of meta-arkose (leptynite) and granitic gneiss in the Saint-Paul-du-Nord and Moulin à Baude formations, and to outline the regional potential of these formations. A few sectors with significant potential for dimension stone were identified (Bellemare, Togola and Lapointe, 2002).

Exploration

Figure 2.1 shows the location of 85 exploration projects brought to our attention in 2002. Project descriptions are listed in Table 2.2.

The **Polycor Group** was very active in 2002. The company acquired several mining properties in Québec. The year's highlight was an announcement made by the FTQ Solidarity Fund to invest $11.4 million (Le Soleil newspaper, October 30, 2002) to acquire specialized equipment for stone extraction and processing. The inauguration of a stone resin unit at their Saint-Sébastien plant adds another dimension to mining activities for old and new varieties of stone. Over the last few years, the company has looked for marble limestone deposits to produce dimension stone and ornamental stone. With this in mind, and prompted by a study conducted by the Department (Bellemare and Jacob, 2001), six mining properties were acquired in the Gaspésie region in 2002. The Port-Daniel (two sectors), Clemville, and Maria properties (Table 2.2, projects 76 to 78) were looked at during the year. Limestones sampled belong to the West Point, La Vieille, and Bonaventure formations and exhibit different colours and textures. In early 2003, the company completed a market study to orient future developments. It also acquired two properties north of Saint-David-de-Falardeau which contain an anorthosite, assigned to the Lac-Saint-Jean anorthositic Suite, that exhibits bluish or copper shimmering highlights. The most extensive work was undertaken in three sectors of a vast property in the eastern half of NTS sheet 22D/11 (Table 2.2, project 47). In Pinsonnault Township, the company continued a sampling program, undertaken in 2000, on a brown monzogabbro (Gaudreau *et al.*, 2001, p.76, site 20). This property, identified as Brun Kodiak (Table 2.2, project 30), is subject to a mining lease application (BEX 402). In Bois Township, stripping and sampling was carried out in two sectors (Table 2.2, project 11) to test a blackish grey, coarse-grained, porphyritic quartz mangerite of the Rivière-à-Pierre Suite. Positive results prompted the company to submit a mining lease application (BEX 401).

During the year 2002, **A. Lacroix et Fils Granit** continued its extensive exploration and development program in the Notre-Dame-de-la-Merci area (Table 2.2, project 5). This is the second work program undertaken on this property since 1996. The company opened two quarry faces to sample and test-polish a bluish grey, shimmering, granoclastic anorthosite. This stone is somewhat lighter-coloured than at the initial site. The property, underlain by rocks of the Morin AMCG Suite, was initially prospected by the Gagnon brothers in the early 1990's.

In 2001, **Granit Yoguy** initiated a sampling program on a greenish grey farsundite belonging to the Rivière-à-Pierre Suite. The company continued to develop its property, identified as Rustic Green (Table 2.2, project 6), by building an access road that leads to a suitable extraction site. The site was stripped and sampled, and the stone is similar to that found at the initial discovery site. Polishing tests gave positive results and the stone will be used for panelling, tiles, and monuments. Block extraction is scheduled to begin in 2003.

2329-1677 Québec (Granitslab) sampled an anorthositic gabbro in Gendron Township (Table 2.2, project 45). Blocks extracted from the initial working face in the fall of 2001 (Perreault *et al.*, 2002, p.81, site 14) were shipped to the company's plant in Stanstead for polishing tests. Additional extraction conducted in 2002 demonstrated that conditions are difficult at this site. The company later acquired part of a mining property, located in a similar geological setting, held by Gervais Simard, who was prospecting for mineral occurrences. In a suitable part of this property, a second quarry face was developed and tests demonstrate that the stone is much more massive.

There were numerous exploration projects in the Saguenay – Lac-Saint-Jean region. In addition to Polycor's project in NTS sheet 22D/11 described above, 21 projects were carried out in this vast region. **Pauline Godin** and **Raymond Cloutier** continued their work undertaken many years ago in an area southeast of Saint-André-du-Lac-Saint-Jean (Table 2.2, project 40). They oriented their efforts to the west of the Vert Saint-André quarry. Here they found a greenish grey, coarse-grained, porphyritic mangerite. The stone, somewhat lighter-coloured than the Vert Saint-André variety, shows a beautiful surface when polished. The results of the 2002 program may lead to more important work. **Lionel Lefebvre** conducted prospecting and stripping to assess a leucocratic bronzite gabbro's potential for dimension stone and funeral monuments (Table 2.2, project 28). The stone is uniform in tone and texture and varies from blackish brown to brownish black depending on the cut face. The grain size is fine or coarse, depending on the sector. Geological mapping outlined two bodies that appear to be distinct. The western boundary of the main body, and the volume of stone available, remain to be defined. Block samples destined to be cut and polished will be required to fully assess this stone's potential and to orient future work. During the year 2001, **Maurice Tremblay** explored a property in the Saint-Henri-de-Taillon area (Perreault *et al.*, 2002, p.81, site 34). The rock is a black, porphyroclastic anorthosite similar to the Noir Taillon variety. In 2002, he stripped an area and sampled blocks from a quarry face in a sector located north of the 2001 study area (Table 2.2, project 36).

In the Côte-Nord region, 17 exploration projects for stone were undertaken in 2002. Over the past two years, the number of projects has significantly increased in this region where the potential to discover and extract plutonic and metamorphic rocks is tremendous. **Mario, Marcel** and **Gilles Bourque** assessed a rock described as epidotized and hematized fault gouge for its ornamental stone potential (Table 2.2, project 63). After stripping and sampling, using a diamond saw, polishing tests were undertaken to determine the aesthetic qualities of this rock, identified as a marble variety on the stone market. Additional work is required to demonstrate the potential of this stone, but preliminary results are promising. **Michel Vaillancourt** carried out stripping and diamond saw sampling on massive outcrops of pinkish grey, migmatized gneiss (Table 2.2, project 61). Promising results prompted **Granitslab** to acquire the property. Block sampling, cutting and polishing tests on slabs are scheduled for 2003. **Donald Bérubé** and **Claude Rouleau** undertook similar work on their mining property located near the property held by Michel Vaillancourt (Table 2.2, project 62). Sawing and polishing tests on blocks are also scheduled for 2003.

In addition to the four exploration projects initiated by Polycor, five other projects targeting limestone were carried out in the Bas-Saint-Laurent and Gaspésie regions. In the Gaspésie region, **Michel Bilodeau, Claude Vachon** and **Roland Fulham** (Table 2.2, project 80), **André Liboiron** and **Pierre Tremblay** (Table 2.2, project 79), **Georges Reid** (Table 2.2, project 73), and the **FRAPMGIM** (Table 2.2, project 74) began prospecting for various facies of limestone belonging to the West Point Formation. Results are encouraging and additional work is scheduled for 2003. These should lead new players to explore in an area where no dimension stone production currently exists. In the Bas-Saint-Laurent region, **André Liboiron** began a project to prospect for calcilutites and siltstones of the Saint-Léon Formation (Table 2.2, project 67). In this area, where three operations currently extract siltstones of this formation to produce landscaping stone, exploration for dimension stone has been scarce over the years.

In the Estrie region, the Vert Mégantic II project (Table 2.2, project 22) generated negative reactions from certain tourism proponents since the property is located near the Parc du Mont Mégantic (La Tribune newspaper, June 6 and 7, 2002). The objectives of this project, spearheaded by **Claude Vachon** and **Michel Bilodeau**, are to compare the mineral and textural features of a greenish grey alkalic syenite with a similar rock extracted by Scotstown Granite between 1949 and 1954. This company produced monument stone that weathers over time when exposed to atmospheric agents. Preliminary results demonstrated that the mineral constituents of the two stone varieties are similar. However, a sample from the Scotstown Granite quarry exhibited mineral characteristics indicating significant hydrothermal alteration, which may explain the rapid degradation of stone extracted from the Scotstown quarry.

The Chibougamau area, which has been traditionally explored for metallic deposits, now joins the list of areas in Québec explored for their stone potential. A project by **Glenn McCormick, Huguette Bouchard** and **Granit C Rouleau** (Table 2.2, project 26) focused on assessing the ornamental stone potential of polygenic conglomerates of the Chibougamau Formation. **Maurice Tremblay** (Table 2.2, project 25) looked at an intermediate intrusive rock of the Barlow pluton.

Industrial minerals

Henri-Louis Jacob

Production

In the industrial mineral sector, twenty mines or quarries were in operation in 2002. Industrial minerals produced in Québec include: asbestos (three mines), high-purity limestone and dolomite (six quarries), titanium minerals (including ilmenite and titanium slag), graphite flakes, ground mica and salt (one mine or quarry each), brine from the **Junex** well in Bécancour, and sulphur recovered as sulphuric acid in non-ferrous metal smelters. Table III and Figure II provide a brief description of each industrial mineral operation.

Preliminary data indicate that in 2002, the total value of industrial mineral shipments stands at $646.4 million, compared to $666.4 million for 2001. This decline is largely attributable to the asbestos industry, which recorded a 15 % drop in shipments due to fierce competition on international markets. The asbestos industry was also affected by a 31-week interruption at the Lac d'Amiante operation due to a lock-out, then the suspension, in October, of operations at the Jeffrey mine, which placed itself under the protection of the Companies' Creditors Arrangement Act. Operations resumed in December for 16 weeks, during which time the company will process stockpiled ore. This temporary production will allow Thyokol, a NASA supplier, to build up strategic reserves for at least ten years.

Graphite shipments also experienced a relatively sharp drop, attributed to reduced demand in the refractory industry and the fierce competition of Chinese producers. In this context, **Timcal Canada Inc.**, the only graphite producer in Québec, reduced, from seven to five days, the work week at the Lac-des-Îles mine. **Timcal Graphite** also invested US$10 million for a new graphite processing plant in Laval. The plant will process graphite from the Lac-des-Îles mine and from imported graphite ore.

Increases in shipments of mica, ilmenite, silica, and salt were noted. In the salt industry, a new player, **Junex Inc.**, began extracting natural brine from a well in Bécancour. Junex is also sinking another well in Sainte-Angèle-de-Laval. This well is scheduled to go into production in 2003. Brines extracted by Junex are used for dust-control and as de-icing agents.

Finally, **Luzenac** permanently shut down its talc operation in Saint-Pierre-de-Broughton. Flotation tests conducted on the talc ore aimed at removing all asbestos fibres did not yield conclusive results, which led the company to abandon its grinding and flotation plant project.

Exploration

Thirty-seven exploration projects targeting fifteen different commodities (rocks or minerals) were reported in 2002 (Figure 2.2 and Table 2.3). Most of these projects consist of grassroots prospecting and sampling, which were carried out, for the most part, either directly or through the various regional mining funds, with funds provided under the Mineral Exploration Assistance Program. The most commonly prospected commodities were: silica (11 projects), talc and steatite (6 projects), limestone (6 projects), and alumino-silicates (andalusite and sillimanite) (4 projects).

Strong demand for high-purity silica used in the production of silicon metal and granules with a high brightness index generated several stripping and sampling programs on quartz veins and quartzite bands. The latter, in nearly all cases, proved to be too small or too impure to justify additional work. Bulk samples for industrial testing (projects 109 and 92) were taken from one large quartz vein located in Low Township, in the Outaouais region, and from an exceptionally pure quartzite deposit located near Fermont.

Pilot studies on graphite ore from the Lac Knife deposit, initially scheduled for 2002 by **Mazarin** and its American partner **Graftech**, were postponed due to lower than anticipated demand for batteries using flexible graphite. The two samples collected in 2001, totalling 3,500 tonnes, are stored in Fermont.

SOQUEM Inc. commissioned Met-CHEM Canada Inc. to update the feasibility study concerning development of its apatite-ilmenite deposit in Sept-Îles (project 115). The deposit, delineated by drillholes in the late 1990's, contains estimated reserves of 107 million tonnes at a grade of 6.0 % P_2O_5 and 8.4 % TiO_2. Now that Norsk Hydro has abandoned the project, SOQUEM Inc. is searching for new partners.

Graymont Calc Inc. continued its efforts to bring into production, in 2003, a large high-purity limestone deposit located on the Rang des Canadiens, 4 km from Saint-Adolphe-de-Dudswell (project 101). This year, the company completed the access road linking the quarry to its lime production plant in Saint-Adolphe-de-Dudswell and extracted a bulk sample for tests in its lime kilns. Extraction operations are scheduled to begin at the new quarry in 2003.

Peat

Pierre Buteau

In 2002, 22 peat producers were active in Québec, harvesting peat from forty peatlands, located mainly in the Bas-Saint-Laurent, Côte-Nord, and Saguenay – Lac-Saint-Jean regions. Total shipments in 2001 reached 10.7 million 170-dm^3 bags, for a total value of $55.4 million. Preliminary data for 2002 suggests a significant rise in shipments of nearly 13 % (11.4 million 170-dm^3 bags), for a total value of about $62.9 million. Québec still ranks second among peat-producing Canadian provinces.

The production season started exceptionally late this year, since most producers began harvesting in mid-June. The first month was difficult given the frequent rainfall throughout Québec. Fortunately, nearly all the producing areas went through dry spells during the second half of July and August. In the end, thanks to a rain-free early fall, the production season was very good in the Bas-Saint-Laurent region between Rivière-Ouelle and Rimouski, as well as along the north shore of the St. Lawrence, west of Baie-Comeau. Producers located east of Rimouski and Baie-Comeau, on the other hand, experienced a very difficult season, in some cases barely reaching 30 % of their normal production. Lac-Saint-Jean producers experienced an average year, with close to normal production figures.

Bas-Saint-Laurent

Tourbières Berger Inc. began marketing peat sold in the form of extruded granules. These granules can be spread using conventional devices and help to restore or improve the quality of lawns thanks to nitrogen-enriched elements which are added during the granulation process. A professional range of granules was also developed for golf greens. This company also produces peat-based animal feed, produced in the form of granules, designed for moose hunting. Finally, **Tourbières Berger Inc.** proceeded with the acquisition of **Tourbières Saint-André** of Saint-Alexandre.

Premier Tech, the parent company of **Premier Horticulture**, acquired **Chronos Richarson Packaging Business** (England). This firm specializes in the design and manufacture of packaging equipment for powdered and granular material. This acquisition makes **Premier Tech** one of the world leaders in the field of bulk material handling and packaging.

Finally, four companies were not in production during the summer 2002. These include **La tourbière Rio-Val** and **Tourbières de la mer** in Saint-Fabien, as well as **Tourbières Mouska** and **Tourbières Saint-Alexandre** in Saint-Alexandre.

Saguenay – Lac-Saint-Jean

Although **Tourbières Blocs Dorés** from Saguenay (La Baie area) did not produce any blocks this year, it was able to sell a fair share of its stockpile. The company is currently restructuring its operation and is also developing a handling and packaging plant near Montréal, where its entire production will eventually be processed.

North Shore of the St. Lawrence Estuary

Les tourbes M. L. from Rivière-du-Loup acquired a few properties from **Québec Inc. 9006-1474 (Tourbières Torland)** in Clarke City. Development work is expected to begin next summer. **Terrassement Mingan** of Sept-Îles became the first producer of Black Frozen Peat in Québec. This is a type of decomposed bulk peat which, after having been extracted and laid out in thin layers, is exposed to the cold during an entire winter (cold-dried). The material then takes on a flaky texture and does not harden upon drying, like regular humified peat. Furthermore, this company has developed a system to produce mega-blocks of high-fibre peat (42-inch cubes). A total of 1,200 blocks were produced and the company is currently developing new markets for this type of product.

Tourbières Lambert completed renovations at its packaging plant in Les Escoumins. Operations are now fully automated. Furthermore, the company developed a technology at its two facilities in the Côte-Nord region to produce what it calls Peat Nuggets. This is a very coarse material, characterized by an excellent porosity network, used in light potting soils.

Exportations Daniel Sage Inc. of Port-Cartier built a new permanent packaging facility. This company, which produces vacuumed peat, focuses an important part of its activities in the production of block peat. In August 2002, its entire production had already been sold, mostly on overseas export markets. Another interesting market developed by this company targets manufacturing companies that build sludge ponds for the pulp and paper industry. Block peat is used in the initial construction phase of these ponds as well as in the closing phase once the ponds are filled.

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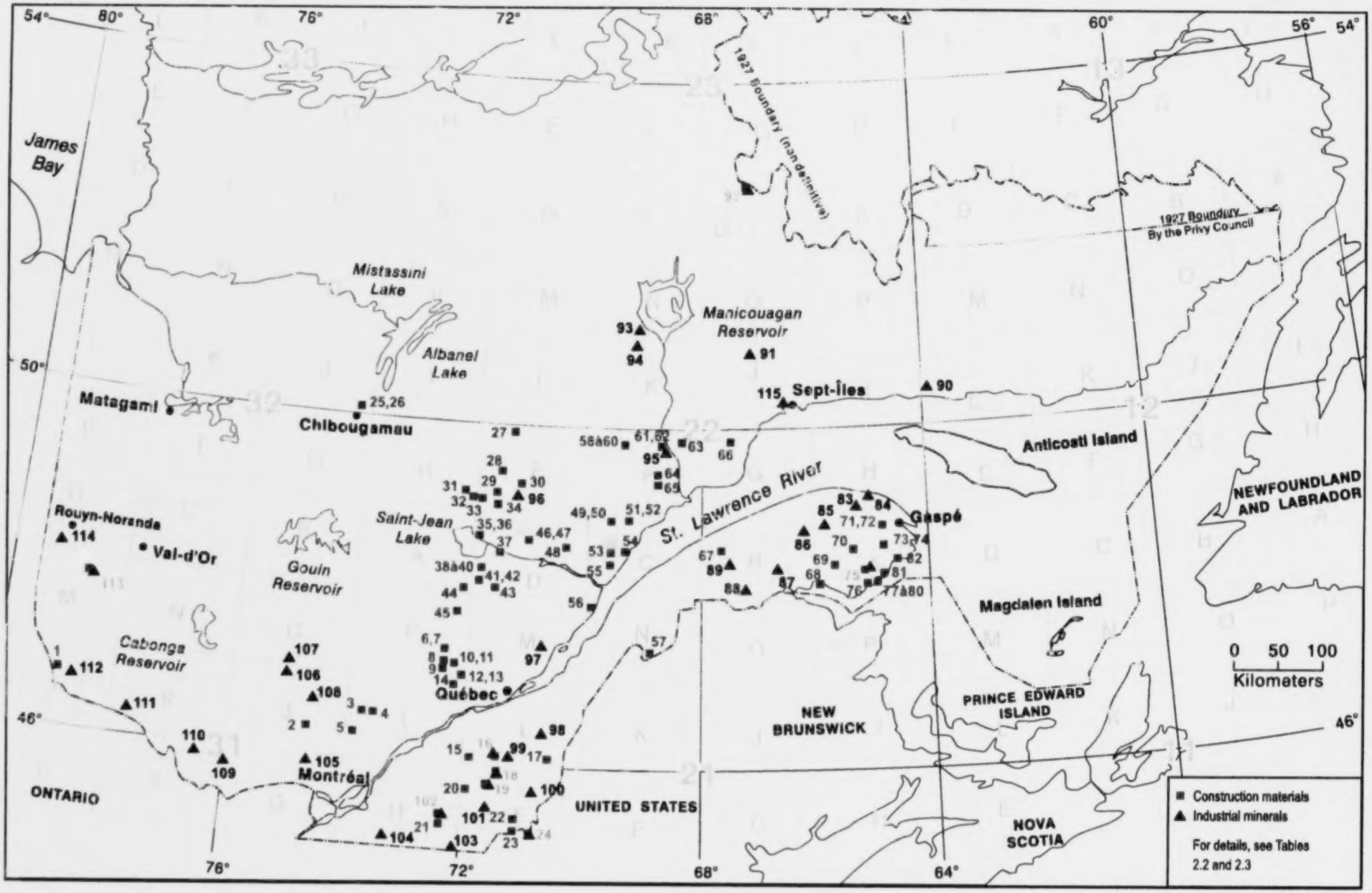

James Bay
Mistassini Lake
Albanel Lake
Matagami
Chibougamau
Rouyn-Noranda
Val-d'Or
Gouin Reservoir
Cabonga Reservoir
Saint-Jean Lake
Manicouagan Reservoir
Sept-Îles
Anticosti Island
St. Lawrence River
Gaspé
Québec
Montréal
Magdalen Island
PRINCE EDWARD ISLAND
NEW BRUNSWICK
NOVA SCOTIA
NEWFOUNDLAND AND LABRADOR
UNITED STATES
ONTARIO
1927 Boundary (non definitive)
1927 Boundary By the Privy Council
54°
80°
76°
72°
68°
64°
60°
56°
50°
46°
0 50 100
Kilometers
■ Construction materials
▲ Industrial minerals
For details, see Tables 2.2 and 2.3

Figure 2-1. Location of exploration projects in Québec in 2002. Construction materials and industrial minerals.

TABLE 2.1 List of new assessment work reports for construction materials in 2002.

PROJECT	NTS	MINING TITLE	HOLDER	GM NUMBER	*	DETAILS
1	21N07	PRS 2485	Victorien Lemay	GM 58760	N. C.	Ardoise, cartographie
2	21N07	PRS 3888, 3889	Glendyne	GM 59222, GM 59523	50 (2001)	Ardoise noire, sondages
3	22A05	PRS 4269	Françoise Bernard, Liliane Roberge	GM 58904, GM 59556	43 (1999)	Basalte aphanitique noir, levé géologique et échantillonnage
4	22A05	PRS 5417	Françoise Bernard, Liliane Roberge	GM 58905, GM 59587	44 (2000)	Basalte aphanitique noir, levé géologique et échantillonnage
5	22A05	PRS 4649	Chris Arsenault	GM 59115	N. C.	Gabbro, prospection, décapage et tranchées
6	22D11	PRS 4339 à 4346	Lucien Girouard, André Rinfret	GM 58781, GM 58799	38 (2001)	Anorthosite à reflet bleuté, prospection et échantillonnage
7	22D11	CLD 1007601	François Villeneuve	GM 58782	39 (2001)	Mangérite quartzifère, gris verdâtre, décapage et échantillonnage
8	22E06	PRS 4468 à 4471	Jean-Claude Gobeil	GM 59101	N. C.	Anorthosite brune, décapage et échantillonnage
9	22E06	PRS 4754	Carrières Polycor	GM 59326	20 (2000)	Monzogabbro brun, échantillonnage et polissage
10	31I16	PRS 3102 et 3294	2329-1677 Québec	GM 58765	N. C.	Roche de la suite charnockitique (verte et brune), échantillonnage
11	31J14, 31O03	PRS 4530	Michel Belisle	GM 59280	4 (1999)	Granite rose de type Guénette, prospection
12	32D03	PRS 3448	143454 Canada	GM 59023	3 (2000)	Diabase noire, levé géologique, échantillonnage

* In reference to project number quoted in Perreault *et al.* , 2002, p. 81-82 (2001), in Gaudreau *et al.* , 2001, p. 76-78 (2000), or in Gaudreau *et al.* , 2000, p. 77-78 (1999) (N. C. : unquoted)

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
1	31L10	Aucun	Les Pierres du Nord	PA, PD	Pr, E	Roche calcosilicatée à trémolite
2	31J07	BEX 337	Les Pierres Mitchell	PA	Pr, E	Paragneiss quartzofeldspathique
3	31I12	CDC 1080788 à 1080791	Exploration Geotech	PD	Pr, G, E, Gc, EF	Projet Lac Thomas, gneiss charnockitique, vert
4	31I12	Aucun	Serge Turcotte	PD	Pr, E, Gc	Gneiss charnockitique vert et noir, à grain moyen
5	31I05	BEX 255	A. Lacroix et Fils Granit	PD	T, E, Gc	Projet Orion, anorthosite granoclastique, chatoyante, noire et gris bleuté
6	31P08	CDC 1019356 à 1019364	Granit Yoguy	PD	T, E, Gc	Projet Vert Rustique, farsundite gris verdâtre
7	31P08	CDC 1033679	Granit Yoguy	PD	E, Gc	Projet Lac Scott, farsundite porphyroïde, brun foncé
8	31P01	CDC 1025555 à 1025561	Granicor	PD	Pr	Gabbro de Lapeyrère
9	31P01	BEX 378	A. Lacroix et Fils Granit	PD	T, E, Gc	Projet Lac Gaulois, gneiss tonalitique et granodioritique, à grain grossier, noir grisâtre
10	31P01	CDC 1029959 à 1029962	A. Lacroix et Fils Granit	PD	E, Gc	Projet Rivière Miguick, granit à grain grossier, rose rougeâtre
11	31P01	BEX 401	Groupe Polycor	PD	T, E, Gc	2 secteurs explorés, mangérite quartzifère, porphyroïde, à grain grossier, gris noirâtre, demande du BEX 401
12	31P01	Aucun	Granite D. R. C., Stone Vogue International	PD	Pr, T, E, Gc	Farsundite porphyroïde, gris brunâtre, à grain grossier
13	31P01	BEX 349	A. Lacroix et Fils Granit	PD	T, E, Gc	Mangérite quartzifère, gris verdâtre
14	31I16	CDC 1040317, 1083475 à 1083478	Granitslab (2329-1677 Québec)	PD	E, Gc	Mangérite quartzifère, porphyroïde, gris verdâtre
15	21L04	Aucun	Michel Vallée	PB	Pr	Projet Ardoise de la Beauce
16	21L03	CDC 1076390	Michel Bilodeau	PE	Pr, E	Projet Wob-In-Ham, canton Inverness, rang I, lot 1, stéatite

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
17	21L02	CDC 1103785 à 1103787	Michel Vallée	PB	Pr, E, S	Projet Saint-Philibert, seigneurie Aubin-de L'Isle, rang Saint-Antoine SE, lot 785, ardoise gris ou gris noirâtre
18	21E14	CDC 1102351	Claude Vachon, Michel et Dany Bilodeau	PE	T, E	Projet Woburn Saint-Julien, canton Wolfestown, rang I, lot 21, stéatite
19	21E13	CDC 1076391	Claude Vachon, Michel Bilodeau	PE	Pr, E	Projet Wob-In-Ham, canton Ham Sud, rang OECG, lot 21, stéatite
20	21E12, 21E13	CDC 1081913	Claude Vachon, Michel Bilodeau	PB	G, E, S	Projet Mel-Ship I et II, canton Shipton, rang IV, lots 5 à 8 et rang V, lots 5 à 9, ardoise de la Formation de Saint-Daniel
21	31H08	Aucun	Jean Longpré, Jean Beaudin, Jean-Guy R. Lacourse	PA	Pr, G, Gp, T, E	Projet Saint-Élie ou Marbre Orford 2002, listwaénite vert rougeâtre et blanchâtre, péridotite noire, granite
22	21E06	CDC 1038236 à 1038240	Claude Vachon, Michel Bilodeau	PA	Pr, E, Gc	Projet Vert Mégantic II, syénite alcaline, gris verdâtre
23	21E06	CDC 1098406, 1099573 à 1099576	Érablière De Lingwick, Pierre Paquette, Richard Beaudoin	PD	Pr	Projet Montagne de Marbre, canton Chesham, rang IX, lot 33 à 35, granit gris et rose
24	21E02, 21E07	CDC 1069976 à 1069978	Michel et Dany Bilodeau	PE	T, E	Projet Woburn Saint-Julien, canton Woburn, rang V, lots 1 à 3, stéatite
25	32J01	CDC 1083447	Maurice Tremblay	PD	E, Gc	Projet Lac Myriqué, roche intrusive intermédiaire du Pluton de Barlow
26	32J01	CDC 1096857, 1098384 à 1098386, 1100377 à 1100379, 1101796, 1101797	Granit C Rouleau, Glenn Mc Cormick, Huguette Bouchard	PD	T, E, Gc	Variété Univers, conglomérat polygénique de la Formation de Chibougamau
27	22E14	BEX 377	A. Lacroix et Fils Granit	PD	E, Gc	Projet Rivière des Prairies, gneiss migmatisé, à grain moyen, rose grisâtre
28	22E05	CDC 1044738 à 1044743, 1083529, 1098300	Lionel Lefebvre	PD	Pr, T, E, Gc	Projet Sonia, gabbro leucocrate à bronzite, brun noirâtre
29	22E05	CDC 1037554 à 1037556	Granit Rock, Rock Maltais, Olivier Perron, Jean-Paul Deschênes	PD	Pr, T, E, Gc	Anorthosite mauve et verte
30	22E06	CDC 1014105 à 1014115	Groupe Polycor	PD	E, Gc	Projet Brun Kodiak, monzogabbro brun, demande du BEX 402

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
31	32H01	BEX 352	A. Lacroix et Fils Granit	PD	E, Gc	Projet Rivière-aux-Rats, monzogabbro brun orangé
32	32H01	CDC 1092132 à 1092134,	Jean-Claude, François et Dany Gobeil	PD	Pr, S	Projet Rivière Savard, anorthosite porphyroclastique, gris noirâtre
33	22E04	CDC 1105867 à 1105869	Granite Péribonka, François Gobeil	PD	E, Gc	Ancien projet Granite bleu, anorthosite porphyroclastique, brune ou noire, à reflet bleuté
34	22E04	CDC 1102432 à 1102437	Lionel Lefebvre	PD	Pr, E, Gc	Farsundite porhyroïde, à grain grossier, orange rougeâtre
35	22D12	Aucun	Granit Rock, Jean-Paul Deschênes	PD	T, E	Anorthosite noire de type Noir Taillon
36	22D12	Aucun	Maurice Tremblay	PD	Pr, T, E, Gc	Projet Saint-Henri-de-Taillon, anorthosite noire de type Noir Taillon
37	22D12	CDC 1003489 à 1003492	Granicor	PD	Pr, E	Gabbro à grain fin, noir grisâtre
38	22D05	CDC 1003407, 1003408	Granicor	PD	T, E	Farsundite porphyroïde et foliée, rose orangé
39	22D05	CDC 1013742 à 1013753	Groupe Polycor	PD	G	Farsundite porphyroïde et foliée, similaire à la variété Betchouan
40	22D05	CDC 1003290, 1003291, 1033663, 1083465 à 1083474	Pauline Godin, Raymond Cloutier	PA	Pr, T, E, Gc	Projet Vert Pauray, mangérite porphyroïde, à grain grossier, gris verdâtre
41	22D04	CDC 1033664	Pauline Godin, Raymond Cloutier	PA	E, Gc	Projet Aigle Rouge, syénogranite à hypersthène, porphyroïde, rose orangé
42	22D04	Aucun	Pauline Godin, Raymond Cloutier	PA	Pr, E	Projet du lac Robert, gneiss migmatisé, gris noirâtre et rougeâtre
43	22D04	CDC 1003438 à 1003441, 1024931	Granicor	PD	Pr, E	Secteur des anciennes carrières Pikoba, mangérite porphyroïde, noir verdâtre
44	32A01	Aucun	François et Dany Gobeil	PD	Pr, S	Projet Lac Mirage, granit brun et beige, à grain grossier et granit rouge foncé
45	31P16	BNEP 649	Granitslab (2329-1677 Québec)	PD	Pr, G, T, E, Gc	Projet Gendron, 2 secteurs explorés, gabbro anorthositique, noir ou noir brunâtre
46	22D11	CDC 1101741 à 1101749	Groupe Polycor	PD	Pr	Anorthosite à reflet bleuté ou cuivré

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
47	22D10, 22D11	CDC 1029921 à 1029927, 1099194 à 1099229, 1099270 à 1099276, 1099723 à 1099725, 1099834, 1101306 à 1101342, 1102225 à 1102248	Groupe Polycor	PD	Pr, G,T, E, Gc	3 secteurs explorés, anorthosite à reflet bleuté ou cuivré
48	22D09	CDC 1037883 à 1037884	France et Patrick Tremblay	PD	T, E, Gc	Projet Feuille d'automne, gneiss syénogranitique, oeillé ou mylonitique, orange rougeâtre
49	22C13	CDC 1005703, 1005704	Éric Hurtubise, Donald Bérubé, Claude Rouleau	PD	S	Projet Granite Sault-au-Cochon (Manicouagan), gneiss granitique, rose rougeâtre
50	22C13	CDC 1102238 à 1102240	Georges Reid	PD	Pr	Gneiss migmatisé, gris rosé
51	22C14	CDC 1005705	Éric Hurtubise	PD	Pr, E	Projet Marinier I, paragneiss
52	22C14	CDC 1026191	Éric Hurtubise	PD	Pr, E	Projet Marinier II, paragneiss
53	22C11	CDC 1046165 à 1046168	Éric Desbiens, Michel Savard	PD	Pr, G, E, Gc	Projet Granite noir d'Iberville, amphibolite noire, gneiss rose rougeâtre et orangé
54	22C12	CDC 1005203	Éric Hurtubise	PD	Pr, E	Projet Granite Sault-au-Mouton, granite rose
55	22C05	CDC 1031837 à 1031839	Éric Hurtubise	PD	Pr, E	Projet Granite Escoumins, 2 secteurs distincts, mangérite porphyroïde
56	21N13	CDC 1022231 à 1022235, 10022239	Granitslab (2329-1677 Québec)	PD	E, Gc	Projet Baie-des-Rochers, gneiss granitique, rose grisâtre
57	21N07	CDC 1101900 à 1101908	Guy Galarneau	PD	Pr	Projet Ardoise Témiscouata, canton Packington, rang I, lots 33 à 38, rang II, lots 34, 35 et 39, ardoise noire
58	22F14	CDC 1099146	Donald Bérubé	PD	Pr, E	Projet Granite Outardes I, granodiorite gris brunâtre
59	22F14	CDC 1099143 à 1099145	Donald Bérubé	PD	Pr, E	Projet Granite Outardes II, mangérite porphyroïde, beige
60	22F14	CDC 1045253 à 1045257, 1106150 à 1106153	Jean Lapierre, Richard Pope	PD	T, E	Projet Granite Outarde 4, gneiss dioritique à grenat, gris rosé

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
61	22F15	CDC 1031592-1031593	Michel Vaillancourt, Granitslab (2329-1677 Québec)	PD	T, E, Gc	Projet Granite Manic III, gneiss migmatisé, gris rosé
62	22F15	CDC 1037983 à 1037996, 1100693, 1100694	Donald Bérubé, Claude Rouleau	PD	T	Projet Granite Manicouagan, gneiss migmatisé, gris rosé
63	22F16	CDC 1053689, 1053690, 1053692, 1053693, 1097681, 1099722	Mario, Marcel et Gilles Bourque	PA	T, E, Gc	Projet Brèche 2002, gouge de faille épidotisée et hématisée
64	22F07	CDC 1048283	Jacques Ferland, Réal Ovila Goulet	PD	T, E, Gc	Projet Lac Bélanger, mangérite à grain fin, vert brunâtre
65	22F07	CDC 1043172 à 1043175	Jean Lapierre, Richard Pope	PD	Pr	Projet Lac Bélanger, mangérite porphyroïde, gris verdâtre et bleuté
66	22G14	CDC 1071786, 1098417	Carmen Pelletier, Maurice Morissette	PD	Pr, E, Gc	Projet Lac-Paul-Côté, gneiss gris, migmatisé et rubané
67	22B05, 22B11, 22B12	Aucun	André Liboiron	PB, PD	Pr	Projet Saint-Léon, calcilutite et siltstone de la Formation de Saint-Léon
68	22A04	Aucun	Groupe Polycor	PD, PA	Pr, G, E, Gc	Projet Maria, calcaire marbrier, gris rosé de la Formation de Bonaventure
69	22A05	CDC 1030098 à 1030103	Liliane Roberge, Françoise Bernard	PD	Pr, G, T, E	Projet Lac Noir, volcanite noire, à grain fin de la Formation du Lac McKay
70	22A11	CDC 1098916	Jean-Baptiste Beaudin, Briard Bradley	PA	Pr, E	Volcanite du Mont-Alexandre, conglomérat à fragments de volcanite et à matrice de calcite, gris noirâtre et rosé
71	22A15	Aucun	FRAPMGIM	PB	Pr, G	Projet Cible 2002, canton Galt, siltstone violet rougeâtre, en lits décimétriques
72	22A15	Aucun	FRAPMGIM	PD	Pr, G	Projet Cible 2002, siltstone gris verdâtre
73	22A10	Aucun	Georges Reid	PD, PA	Pr, E	Calcaire récifal de la Formation de West Point
74	22A10	Aucun	FRAPMGIM	PD	Pr, G	Projet Cible 2002, calcaire récifal de la Formation de West Point, brun et rouge
75	22A06	PRS 5663, CDC 1101370 à 1101372	Roland Fulham, Steve Lebrasseur	PD, PE	G, T, E, Gc	Projet Ollaire 2, stéatite, serpentinite vert olive

TABLE 2.2 Exploration work in Québec for construction materials in 2002 (see figure 2.1).

PROJECT	NTS	MINING TITLE	HOLDER	USE *	TYPE OF WORK **	DETAILS
76	22A03	CDC 1039222 à 1039227	Groupe Polycor	PD, PA	Pr, G, E, Gc	Projet Clemville, calcaire de la Formation de La Vieille
77	22A02	Aucun	Groupe Polycor	PD, PA	Pr, G, E, Gc	Projet Port-Daniel ouest, calcaire de la Formation de West Point
78	22A02	Aucun	Groupe Polycor	PD, PA	Pr, G, E, Gc	Projet Port-Daniel est, calcaire de la Formation de West Point
79	22A02	Aucun	André Liboiron, Pierre Tremblay	PD	Pr, G, T, E, Gc	Projet Colline Daniel, calcaire de la Formation de West Point
80	22A02	CDC 1067360 à 1067368	Michel Bilodeau, Claude Vachon, Roland Fulham	PD	Pr, G, E, Gc	Projet West Point, calcaire de la Formation de West Point
81	22A07	Aucun	Georges Reid	PD	Pr, E	Grès violet rougeâtre du Groupe de Maquereau
82	22A07	Aucun	Georges Reid	PD, PA	Pr, E	Calcaire gris foncé avec veines de calcite de la Formation de Pabos
92* **	23B14	BNEP 640	Paul Blackburn	PB, PD	Pr, E, Gc	Projet Silice du lac Daviault, quartzite blanc grisâtre
102* **	31H08	CDC 1041125	Denis J. Kouri	PA	Pr, G, E, S	Projet Stukely, canton Stukely, rang VI, lot 13, marbre calcitique, blanc
113* **	31M15	CDC 1102086 à 1102090	Les Pierres du Nord	GD	Pr, T, E	Projet Canton Clérion, veine de quartz vert et granite blanc orangé

* GD : decorative aggregates; PA : decorative stone; PB : building stone or landscaping; PD : dimension stone; PE : refractory stone.

** E : sampling; EF : feasibility and/or market study; G : geological survey ; Gc : rock geochemical survey or test ; Pr : prospecting ; S : drilling ; T : trenching or stripping.

*** Project mainly directed for exploration of industrial stones or minerals and, secondly, for the exploration of construction materials.

▨ MRN subsidized project.

TABLE 2.3 Exploration work for industrial minerals in Québec in 2002 (see figure 2.2).

SITE	TOWNSHIP OR SEIGNIORY	NTS	COMPANY OR PROSPECTOR	PROJECT	SUBSTANCE	WORK *
16	Inverness	21L/03	M. Bilodeau	Wob-In-Ham	talc et stéatite	Pr,E
18	Wolfestown	21E/14	M. Bilodeau	Woburn-St-Julien	talc et stéatite	T,E
19	Ham-Sud	21E/13	M. Bilodeau	Wob-In-Ham	talc et stéatite	Pr,E
24	Woburn	21E/07	M. Bilodeau	Woburn-St-Julien	talc et stéatite	T,E
75	Weir	22A/06	R. Fulham et S. Lebrasseur	Ollaire 2	talc et steatite	Pr,T,E
83	Lefrançois	22H/03	J. Y. Lavoie/J. M. Marin/Soquem	Calcaire Lefrançois	calcaire	EF
84	Denoue	22H/03	Poly-vein Expl. Inc	Alumine	schiste argileux	ET
85	Lesseps	22A/13	J.Y. Lavoie/J.M. Marin/Soquem	Calcaire Lachance	calcaire	G,S
86	Lemieux et Richard	22B/16	Tom Exploration inc.	Mont Tuzo	bentonite et perlite	E,Ev,TC
87	Fauvel	22B/07	J.Y. Lavoie et J. M. Marin	Silice Ruisseau Lavoie	silice	Pr,E
88	De Roncevaux	22B/03	J. M. Marin	Silice Sainte-Florence	silice	Pr,T,E
89	Awantjish	22B/05	Georges Reid	Carrière Saint-Cléophas	dolomie	T,E
90	-	12L/05	B. Picard/G. Picard/M. Richard	Picard	ilménite	Pr,T,E
91	-	22J/04	Soquem inc	Grand Lac du Nord	sillimanite	TC
92	Lislois	23B/14	Quebec/Labrador Exploration	Lac Daviault	silice	E,G,T,Ev,TC
93	1548	22N/03	Quinto Technology	Lac Guéret	graphite	G,T,E
94	-	22K/14	Phil Boudrias	Lac Guinecourt	graphite	Pr,Gp,E
95	-	22F/10	J. Ferland	Lac Robot	apatite	Pr

TABLE 2.3 Exploration work for industrial minerals in Québec in 2002 (see figure 2.2).

SITE	TOWNSHIP OR SEIGNIORY	NTS	COMPANY OR PROSPECTOR	PROJECT	SUBSTANCE	WORK *
96	Saint-Onge et Faraud	22E/03	Gaétan Tremblay	Saint-Onge/Faraud	ilménite	Pr
97	Côte de Beaupré	21M/07	Georges Reid	Saint-Placide	silice	Pr,E
98	Frampton	21L/07	R. Pouliot/FEMECA,	Mont Frampton	silice	Pr,T,E
99	Thetford	21L/13	M. Bilodeau	Pontbriand	talc et stéatite	Pr,E
100	Gayhurst	21E/15	L. Côté/FEMECA	Mont St-Sébastien II	andalousite	G,T,E
101	Dudswell	21E/12	Graymont (Qc) inc.	Carrière #6	calcaire	Ev,TC
102	Stukely	31H/08	Denis Kouri	Stukely	marbre	Pr,S
103	Stanstead	31H/01	Christian Royer	Peasly	silice	Pr,G,E,T
104	Beauharnois	31H/04	Antoro Resources inc	Sainte-Clotilde	silice	ET,S
105	Amherst	31G/15	Société Minière Gerdin	St-Rémi d'Amherst	silice et kaolin	T,Ev
106	Leman	31J/14	Michel Bélisle	sillimanite	sillimanite	G,T,E,S
107	Chopin	31O/03	Michel Bélisle	Marbre dolomitique	dolomie	S
108	Viel	31J/10	J. M. Pronovost	Siliviel 2002	silice	Pr,E,TC
109	Low	31F/16	Les Mines Burmor International	Mine Gendron	silice	Ev,TC
110	Huddersfield	31F/15	Bernard Charron	apatite Huddersfield	minéraux de collection	Pr,E
111	Edwards	31L/08	Denis Cyr	Sillim	sillimanite	G,E
112	Gendreau, Campeau, Raisenne, LeCaron	31L/10	Gérard Houle	Beauchesne	muscovite	Pr,T,E
113	Clérion	31M/15	Gérard Houle	Clérion	silice	Pr,E

TABLE 2.3 Exploration work for industrial minerals in Québec in 2002 (see figure 2.2).

SITE	TOWNSHIP OR SEIGNIORY	NTS	COMPANY OR PROSPECTOR	PROJECT	SUBSTANCE	WORK *
114	Beauchastel	32D/03	Gérard Houle	Twin Lake	silice	Pr,E,TC
115	Arnaud	22J/02	Soquem inc	Sept-Iles	apatite, ilménite	EF

* E : sampling ; EE: environmental study ; EF : feasibility study ; EM : market study ; ET : technical evaluation study and compilation ; Gc : soil, rock or stream geochemical survey ; Gp : geophysical survey ; Pr : prospecting ; S : diamond drilling ; T : trenching and stripping; TM : metallurgical testing.

MRN subsidized project.

Chapter 3

Financial Assistance for mining exploration

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3

Financial Assistance Programs for Exploration

Jean Choinière

This chapter describes mineral exploration projects that, over the course of the year 2002, received financial assistance from the Ministère des Ressources naturelles (MRN). Subsidized projects are shown in figures 3.1 (prospector projects) and 3.2 (company projects). These projects are described in chapters 1 and 2 of this report.

Within the scope of the **Québec Mineral Exploration Assistance Program (MEAP),** the MRN allocated, for the 2002-2003 fiscal year, a budget of $7.58 million to support mineral exploration in Québec. The MEAP provides financial assistance to prospectors for their grassroots and advanced prospecting activities and to companies for their surface exploration, deep drilling, and advanced exploration programs. In certain administrative regions, the MRN has entrusted the management of prospector assistance to regional mining funds. Financial assistance is also granted to native mining funds.

Prospectors and Regional Exploration Funds

Grassroots and Advanced Prospecting (MEAP – Component A): Financial assistance is granted to individual prospectors to carry out projects outside of areas covered by regional mining funds. This assistance may reach $5,000 for grassroots prospecting and $15,000 for advanced prospecting activities. A total of 44 projects were subsidized, for an amount of $0.36 million.

Regional Exploration Funds (MEAP – Component C): A new regional exploration fund was created in 2002: the Fonds de prospection minière jamésien, bringing the total number of funds to six. Their respective territories are shown in Figure 3.1. The MRN granted to each fund an amount of $250,000, for a total of $1.5 million, to be distributed as financial assistance to individual prospectors involved within their respective territories and to conduct, if so desired, their own exploration activities. The terms and conditions governing financial assistance granted to individual prospectors by regional funds are the same as under component A. The funds granted a total amount of $0.84 million for the completion of 154 projects and allocated $0.66 million to their own in-house projects.

Companies

Surface Exploration (MEAP – Component B): Financial assistance representing 50 % of exploration expenditures incurred by a company, to a maximum of $50,000 per project, may be granted. This amount may reach $75,000 if the project is located in the Near or Far North. For the 2002-2003 fiscal year, financial assistance for companies was restricted to the Abitibi-Témiscamingue and Côte-Nord administrative regions. A total of $0.8 million was allocated to support 19 exploration projects.

Advanced Exploration and Deep Drilling (MEAP – Component D): This measure is designed to stimulate the renewal of mining reserves by providing financial assistance to companies conducting advanced exploration that requires an investment greater than $250,000 and for deep drillholes exceeding 400 metres in length. Financial assistance for advanced exploration corresponds to 50 % of expenses incurred by the company, to a maximum of $1 million. A total of $3.96 million was granted to support eight projects. Financial assistance for deep drilling represents 50 % of the cost of drilling for the part between 400 metres and 1,000 metres in length and 75 % of the cost of drilling for the part exceeding 1,000 metres in length, to a maximum of $50,000 per drillhole. A total of $0.31 million was awarded to two projects.

Native Mining Funds (MEAP – Component E)

The MRN has favoured the creation of native mining funds in order to encourage the involvement of native communities in the Near and Far North to develop the mineral potential of these vast regions. A new native mining fund was created in 2002: the Cree Mineral Exploration Board (CMEB). This new fund joins the two funds already in place: the Nunavik Mineral Exploration Fund (NMEF) and the Nitassinan Innu Mining Fund (NIMF). An amount of $0.65 million was awarded to these funds. Their respective territories are shown in Figure 3.1. At the time of writing, the CMEB was still in the start-up phase and had not yet launched prospecting activities. Activities at the NIMF essentially consisted in offering field training to new prospectors. The NMEF helped nine native prospectors carry out their projects and the fund also conducted three of its own exploration projects, in addition to offering prospecting courses in two communities. It also organized, for the third consecutive year, its annual Rock Contest, in which 59 participants submitted 100 samples, 65 of which were assayed. Two new mineral occurrences were identified through this initiative, in addition to a mineralized erratic boulder.

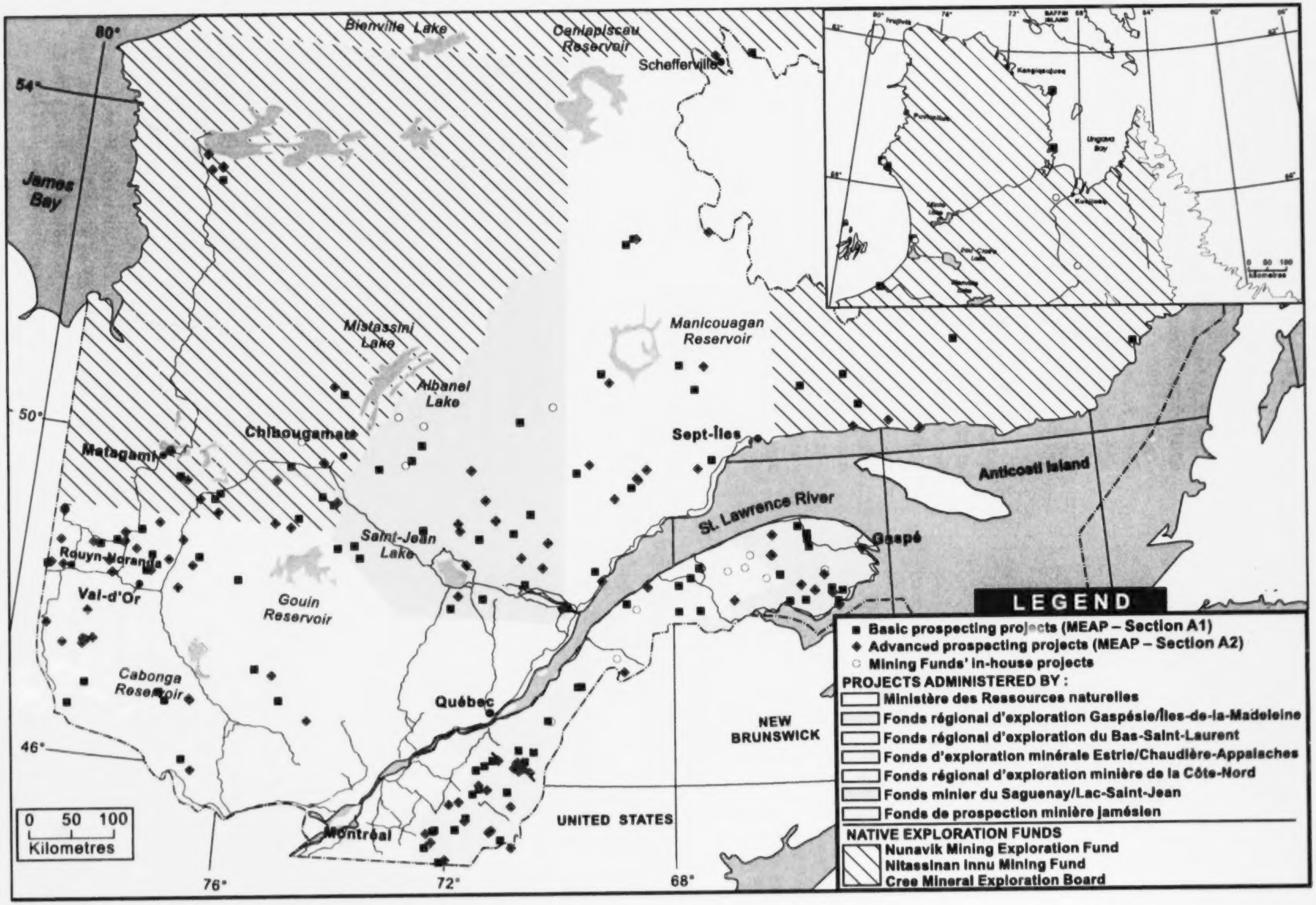

Bienville Lake
Caniapiscau Reservoir
Schefferville
James Bay
80°
54°
Mistassini Lake
Albanel Lake
Manicouagan Reservoir
50°
Chibougamau
Matagami
Sept-Îles
Anticosti Island
St. Lawrence River
Gaspé
Saint-Jean Lake
Rouyn-Noranda
Val-d'Or
Gouin Reservoir
Cabonga Reservoir
Québec
NEW BRUNSWICK
46°
Montréal
UNITED STATES
0 50 100
Kilometres
76°
72°
68°
Ungava Bay
Kuujjuaq
LEGEND
■ Basic prospecting projects (MEAP – Section A1)
◆ Advanced prospecting projects (MEAP – Section A2)
○ Mining Funds' in-house projects
PROJECTS ADMINISTERED BY :
Ministère des Ressources naturelles
Fonds régional d'exploration Gaspésie/Îles-de-la-Madeleine
Fonds régional d'exploration du Bas-Saint-Laurent
Fonds d'exploration minérale Estrie/Chaudière-Appalaches
Fonds régional d'exploration minière de la Côte-Nord
Fonds minier du Saguenay/Lac-Saint-Jean
Fonds de prospection minière jamésien
NATIVE EXPLORATION FUNDS
Nunavik Mining Exploration Fund
Nitassinan Innu Mining Fund
Cree Mineral Exploration Board

Figure 3-1. Location of prospecting projects subsidized by the MRN in 2002.

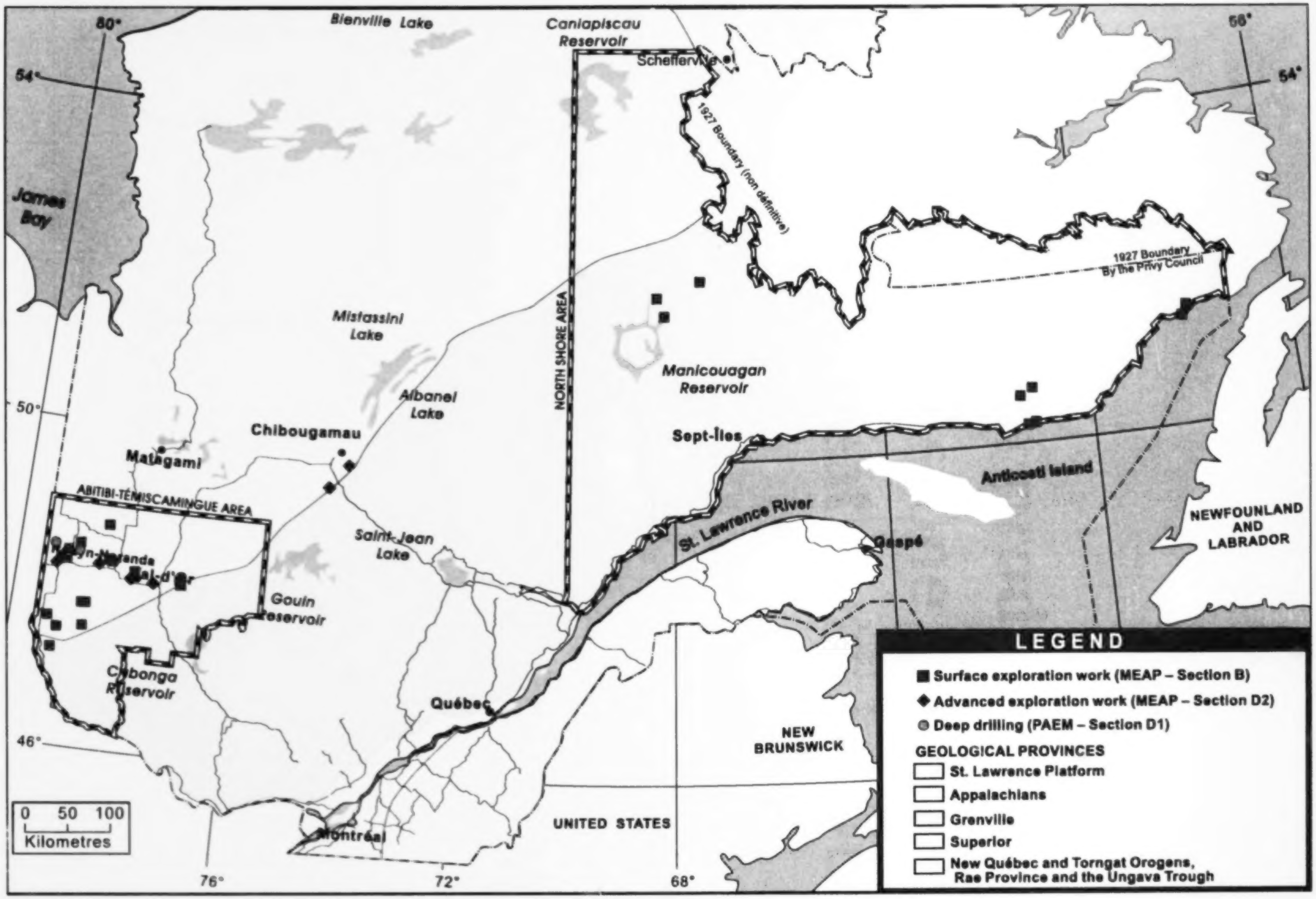

Bienville Lake
Caniapiscau Reservoir
Schefferville
1927 Boundary (non définitive)
1927 Boundary By the Privy Council
80°
54°
58°
54°
James Bay
Mistassini Lake
Albanel Lake
Chibougamau
Matagami
NORTH SHORE AREA
Manicouagan Reservoir
Sept-Îles
Anticosti Island
NEWFOUNLAND AND LABRADOR
50°
ABITIBI-TÉMISCAMINGUE AREA
Rouyn-Noranda
Val-d'Or
Saint-Jean Lake
Gouin Reservoir
St. Lawrence River
Gaspé
Cabonga Reservoir
Québec
NEW BRUNSWICK
46°
0 50 100
Kilometres
Montréal
UNITED STATES
76°
72°
68°
LEGEND
■ Surface exploration work (MEAP – Section B)
◆ Advanced exploration work (MEAP – Section D2)
● Deep drilling (PAEM – Section D1)
GEOLOGICAL PROVINCES
☐ St. Lawrence Platform
☐ Appalachians
☐ Grenville
☐ Superior
☐ New Québec and Torngat Orogens, Rae Province and the Ungava Trough

Figure 3-2. Location of MRN subsidized company exploration projects in 2002.

Appendix

Location of producing mines, architectural stone quarries and peat bogs in Québec

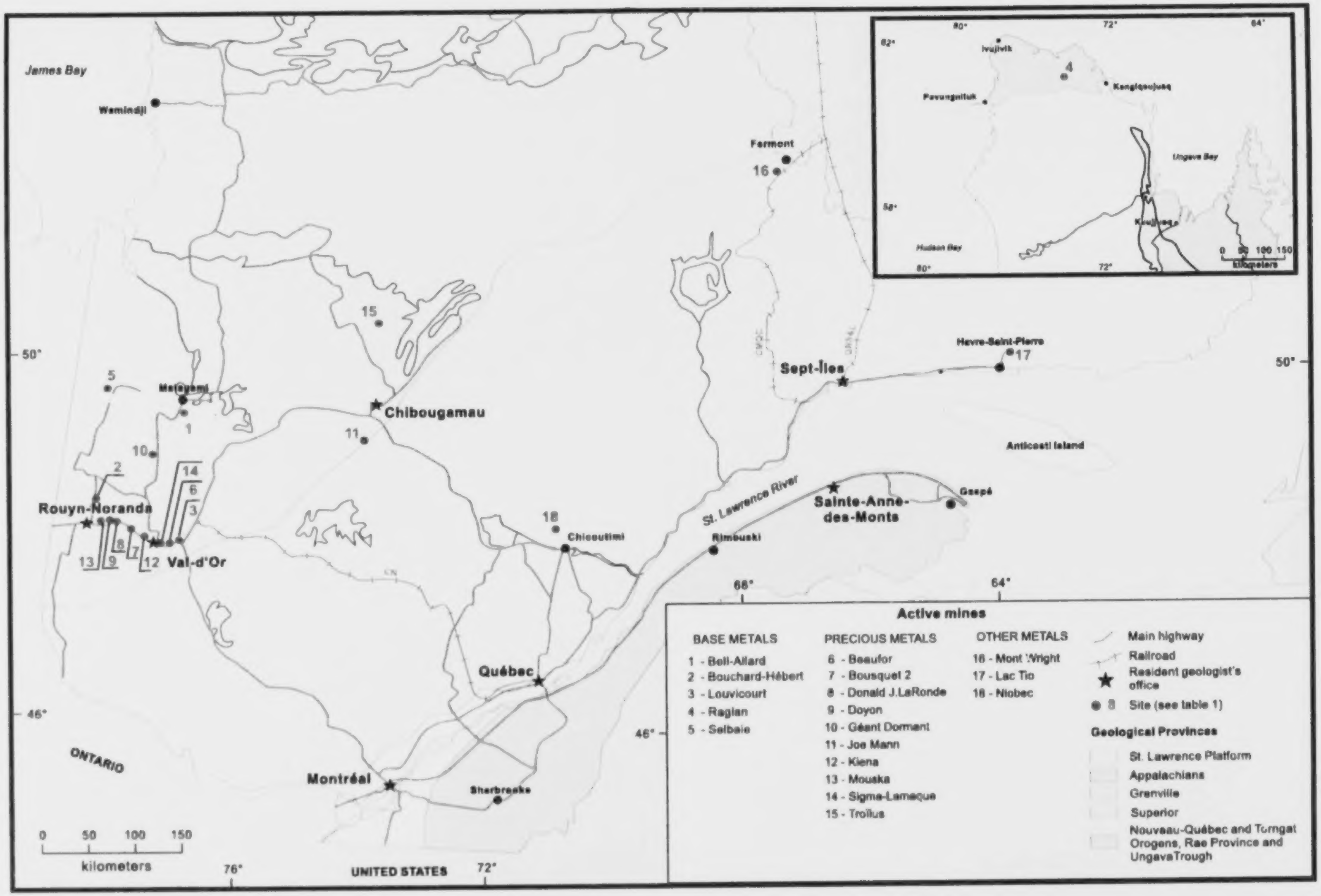

James Bay
Wemindji
Fermont
16
15
5
Matagami
1
10
2
14
6
3
Rouyn-Noranda
13
9
8
7
12
Val-d'Or
Chibougamau
11
18
Chicoutimi
Sept-Îles
Havre-Saint-Pierre
17
Anticosti Island
St. Lawrence River
Sainte-Anne-des-Monts
Gaspé
Rimouski
Québec
Montréal
Sherbrooke
ONTARIO
UNITED STATES
50°
46°
76°
72°
68°
64°
0 50 100 150
kilometers
Ivujivik
Povungnituk
Kangiqsujuaq
4
Ungava Bay
Hudson Bay
Kuujjuaq
82°
80°
72°
64°
58°
0 50 100 150
kilometers
Active mines
BASE METALS
1 - Bell-Allard
2 - Bouchard-Hébert
3 - Louvicourt
4 - Raglan
5 - Selbaie
PRECIOUS METALS
6 - Beaufor
7 - Bousquet 2
8 - Donald J.LaRonde
9 - Doyon
10 - Géant Dormant
11 - Joe Mann
12 - Kiena
13 - Mouska
14 - Sigma-Lamaque
15 - Troilus
OTHER METALS
16 - Mont Wright
17 - Lac Tio
18 - Niobec
Main highway
Railroad
Resident geologist's office
8 Site (see table 1)
Geological Provinces
St. Lawrence Platform
Appalachians
Grenville
Superior
Nouveau-Québec and Torngat Orogens, Rae Province and Ungava Trough

Figure I. Active mines in Québec for 2002 (metallic substances).

Table I - Production of metalic substances in Québec (see figure 1).

Base metals : Cu and Zn (Au and Ag)

Site	Mine	Company	Summary description of the deposit	Ore process in 2002	Metal production in 2002	Ore processed in 2002	Proven mineral reserves (at January 1st 2003)	Probable mineral reserves (at January 1st 2003)	Employees in 2002	Cumulative production	Number of years of production	Township / NTS / Administrative area/ Mining district
1	Bell Allard	Noranda	VMS-type	669 038 t 1 30% Cu 13 31% Zn 0 79 g/t Au 42 23 g/t Ag 0 12% Pb	7 399 81 t Cu 82 204 59 t Zn 221 27 kg Au 11 150 52 kg Ag	Mine Matagami	***1 173 000 t 1 30% Cu 12 8% Zn 0 57 g/t Au 38 0 g/t Ag 0 1% Pb	***329 000 t 1 1% Cu 19 9% Zn 0 35 g/t Au 41 0 g/t Ag 0 1% Pb	260	1 928 822 t 1 31% Cu 12 78% Zn 0 71 g/t Au 41 02 g/t Ag	2000-20 (3)	Galinee 32F/12 **Val-d'Or**
2	Bouchard-Hebert	Ressources Breakwater	Massive sulfides (PY-SP-CP) subvertical lenses in rhyolites and pyroclastics	1 050 009 t 0 68% Cu 5 57% Zn 1 16 g/t Au 39 05 g/t Ag	6 055 t Cu 51 199 t Zn 626 kg Au 13 895 kg Ag	Mine Bouchard-Hebert	***2 102 500 t 0 42% Cu 6 02% Zn 1 02 g/t Au 31 06 g/t Ag	***40 600 t 0 26% Cu 6 60% Zn 1 75 g/t Au 26 35 g/t Ag	150	7 439 991 t 0 88% Cu 4 64% Zn 1 53 g/t Au 46 32 g/t Ag	1995-20 (8)	Dufresnoy / 32D/07 / 08 / **Rouyn-Noranda**
3	Louvicourt	Ressources Aur	VMS-type associated with Val d'Or Formation, dominated by lapilli ash tuffs and exhalative chert	1 485 051 t 3 13 % Cu 1 61% Zn 0 83 g/t Au 24 05 g/t Ag	43 394 t Cu 17 007 t Zn 781 5 kg Au 18 492 kg Ag	Mine Louvicourt	***2 599 839 t 3 00% Cu 1 88% Zn 0 81 g/t Au 25 20 g/t Ag	***29 524 t 0 14% Cu 7 15% Zn 0 82 g/t Au 38 60 g/t Ag	290	12 605 507 t 3 55% Cu 1 51% Zn 0 94 g/t Au 25 84 g/t Ag	1994-20 (9)	Louvicourt / 32C/04 / 08/ **Val-d'Or**
4	Raglan	Societe miniere Raglan du Quebec	Magmatic massive sulfides lenses at the base of ultramafic flows	868 648 t 3 35% Ni 0 97% Cu 0 24 g/t Au 2 7g/t Ag 0 06% Co	25 456 t Ni 7 024 t Cu 183 kg Au 1 482 kg Ag 470 t Co	Concentrateur - Raglan / smelter - Sudbury / refinery - Norvege	N a	N a	454	N a	1998-20 (5)	35G/09, 35H/11 et 35H/12 / **Sept-Îles**
5	Selbaie	Metaux Billiton Canada	Disseminated SP-PY-CP associated with network veins in a rhyodacite breccia and dacitic welded tuff	1 672 946 t 0 27% Cu 1 71% Zn 0 16 g/t Au 56 3 g/t Ag	10 463 t Cu 38 858 t Zn 666 5 kg Au 77 126 kg Ag	Les mines Selbaie	**4 360 000 t 0 28% Cu 1 24% Zn 0 24 g/t Au 22 4 g/t Ag (Stockpiled ore)	—	210	49 099 795 t 0 90% Cu 1 96% Zn 0 61 g/t Au 41 97 g/t Ag	1981-20 (21)	Brouillan / 32E/15 / 10/ **Rouyn-Noranda**

Table I - Production of metalic substances in Québec (see figure 1).

Precious metals : Au and Ag												
Site	**Mine**	**Company**	**Summary description of the deposit**	**Ore process in 2002**	**Metal production in 2002**	**Ore processed in 2002**	**Proven mineral reserves (at January 1st 2003)**	**Probable mineral reserves (at January 1st 2003)**	**Employees in 2002**	**Cumulative production**	**Number of years of production**	**Township / NTS / Administrative area/ Mining district**
6	Beaufor	Mines Richmont	Gold-bearing veins located inside of E-W shear zones at the margin of the Bourlamaque batholith	207 671 t 8.47g/t Au 0.48 g/t Ag	1 744 kg Au 103 kg Ag	Usine Camflo	***245 348 t 7.53 g/t Au	***767 355 t 7.55 g/t Au	95	967 035 t 8.27 g/t Au	1996-20 (6)	Pascalis / 32C/04 / 08 / **Val-d'Or**
7	Bousquet 2	Barrick Gold Corporation	Massive and semi-massive pyrite lenses in andalusite-bearing schists	764 494 t 6.25 g/t Au 3.8 g/t Ag 0.18% Cu	4 379 kg Au 2 704 kg Ag 1 154 t Cu	Usine East-Malartic	Nil	Nil	N.a	8 139 752 t 8.25 g/t Au 0.57% Cu	1990-2002 (13 years)	Bousquet / 32D/08 / 08 / **Rouyn-Noranda**
8	Donald J LaRonde	Les Mines Agnico Eagle	Massive and semi-massive pyrite lenses in sericitized felsic volcanics and metamorphosed in andalusite and kyanite-bearing schists	1 707 038 t 5.10 g/t Au 80.48 g/t Ag 0.35% Cu 4.04% Zn 0.45% Pb	8 214 kg Au 116 379 kg Ag 4 352 t Cu 57 866 t Zn	Concentrateur Division LaRonde Preissac	**4 141 259 t 2.43 g/t Au 101.97 g/t Ag 0.20% Cu 0.05% Zn 0.69% Pb	**27 085 463 t 3.23 g/t Au 73.66 g/t Ag 0.39% Cu 3.62% Zn 0.46% Pb	450	12 005 553 t 6.12 g/t Au 35.84 g/t Ag 0.40% Cu	1988-20 (15)	Bousquet / 32D/08 / 08 / **Rouyn-Noranda**
9	Doyon	Cambior	Veinlets and disseminated pyrite in sericite schists, in intermediate felsic volcanics and in Mooshla pluton	1 152 142 t 4.57 g/t Au	5 088 kg Au 2 519 kg Ag	Mine Doyon	***3 671 700 t 4.8 g/t Au	***4 192 100 t 5.2 g/t Au	435	25 715 759 t 5.88 g/t Au	1980-20 (23)	Bousquet / 32D/07 / 08 / **Rouyn-Noranda**
10	Geant Dormant	Cambior et Mines Aurizon	Gold-bearing quartz and sulfides veins at contact between dacitic intrusions and lava flows	203 000 t 10.5 g/t Au 15.8 g/t Ag	2 057 kg Au 3 136 kg Ag	Mine Geant Dormant	***177 000 t 12.1 g/t Au 18.2 g/t Ag	***200 000 t 12.9 g/t Au 19.4 g/t Ag	187	2 148 655 t 9.93 g/t Au	1987-1991 1993-20 (13)	Chaste / 32F/04 / 10 / **Val-d'Or**
11	Joe Mann	Ressources Meston	Sulfides-bearing quartz veins in gabbro and sheared rhyolite	143 881 t 8.23 g/t Au 5.14 g/t Ag 0.20% Cu	1 011 kg Au 451 kg Ag 265 t Cu	Usine Campbell	***153 225 t 8.16 g/t Au 5.14 g/t Ag 0.20% Cu	***361 063 t 9.12 g/t Au 5.14 g/t Ag 0.20% Cu	172	4 433 102 t 7.58 g/t Au 0.23% Cu	1956-1959 1974-1975 1987-20 (22)	Rohault / 32G/08 / 10 / **Chibougamau**
12	Kiena	Mines McWatters	Auriferous breccia and quartz veins localized between two komatiitic flows	232 784 t 2.98 g/t Au	673 kg Au 229 kg Ag	Mine Kiena	Nil	Nil	67	10 532 884 t 4.80 Au	1981-2002 (21)	Dubuisson / 32C/04 / 08 / **Val-d'Or**
13	Mouska	Cambior	Quartz veins in the Mooshla diorite close to the northern sheared contact	N.a	N.a	Mine Doyon	N.a	N.a	N.a	N.a	1991-20 (12)	Bousquet / 32D/07 / 08 / **Rouyn-Noranda**
14	Sigma-Lamaque	Mines McWatters	Subhorizontal auriferous tourmaline-bearing quartz-pyrite veins in shear zones	110 249 t 2.67 g/t Au	150 kg Au 25 kg Ag	Sigma	***10 297 858 t 2.67 g/t Au	-	150	25 324 955 t 5.45 g/t Au	1938-20 (65)	Bourlamaque / 32C/04 / 08 / **Val-d'Or**
15	Troilus	Corporation Minière Inmet	Au-Cu porphyry in diorite	5 950 333 t a 1.08 g/t Au 0.132% Cu	5 128 kg Au 7 234 kg Ag 6 208 t Cu	Troilus	***6 700 000 t 1.00 g/t Au 0.09% Cu	***18 966 600 t 1.00 g/t Au 0.09% Cu	303	29 745 326 t 1.17 g/t Au 0.12% Cu	1997-20 (5)	32O/ 01/ 10/ **Chibougamau**

Table I - Iron, ilmenite and niobium productions in Québec (see figure I).

Site	Mine	Company	Summary description of the deposit	Total production in 2002	Total shipment in 2002	Shipment of iron pellets and concentrate in 2002	Reserves (at January 1st 2003)	Employees in 2002	Cumulative production	Years of production	Township / NTS / Administrative area/ Mining district
16	Mont Wright	Compagnie minière Québec Cartier	Specular hematite in metamorphosed iron formation of the Gagnon Group	11 106 927 t	12 215 804 t	8 196 036 t (pellets) 4 019 768 t (concentrate)	N a	1859 (Mt-Wright + Port -Cartier)	N a	1976-20 (23)	Normanville / 23B/14, 23B/11 et 23B/09 / 09 / **Sept-Îles**
17	Lac Tio	QIT Fer and Titane	Massive hemo-ilmenite in anorthosite associated with the Havre-Saint-Pierre intrusive suite	N a	N a	N a	N a	N a	N a	1950-20 (50)	Parker/ 12L/09 et L/11 / 09 / **Sept-Îles**
18	Niobec	Cambior and Mazarin	Pyrochlore in the St-Honore carbonatite	N a	4 887 t FeNb	N a	23 836 267 t 0.65% Nb2O5	220	N a	1976-20 (27)	Simard / 22D/11 / 05 / **Montreal-Estrie-Laurentides**

Abbreviation List

Au: Gold
Ag: Silver
Cu: Copper

BO: Biotite
CP: Chalcopyrite
PO: Pyrrhotite

PY: Pyrite
Nb: Niobium
SP: Sphalerite

Zn: Zinc
VMS: Volcanogenic massive sulfides
Ni: Nickel

N a : Not available
t: Metric ton

NOTE:

The data compiled in this table are preliminary and have been collected from mining companies before they published their financial statements.

The difference between proven mineral reserves and probable mineral reserves is defined according to the CIM standards.

The reserves compiled in this table take into consideration:

*** Ore losses**
**** Ore dilution**
***** Ore losses and ore dilution**
****** None of those factors**

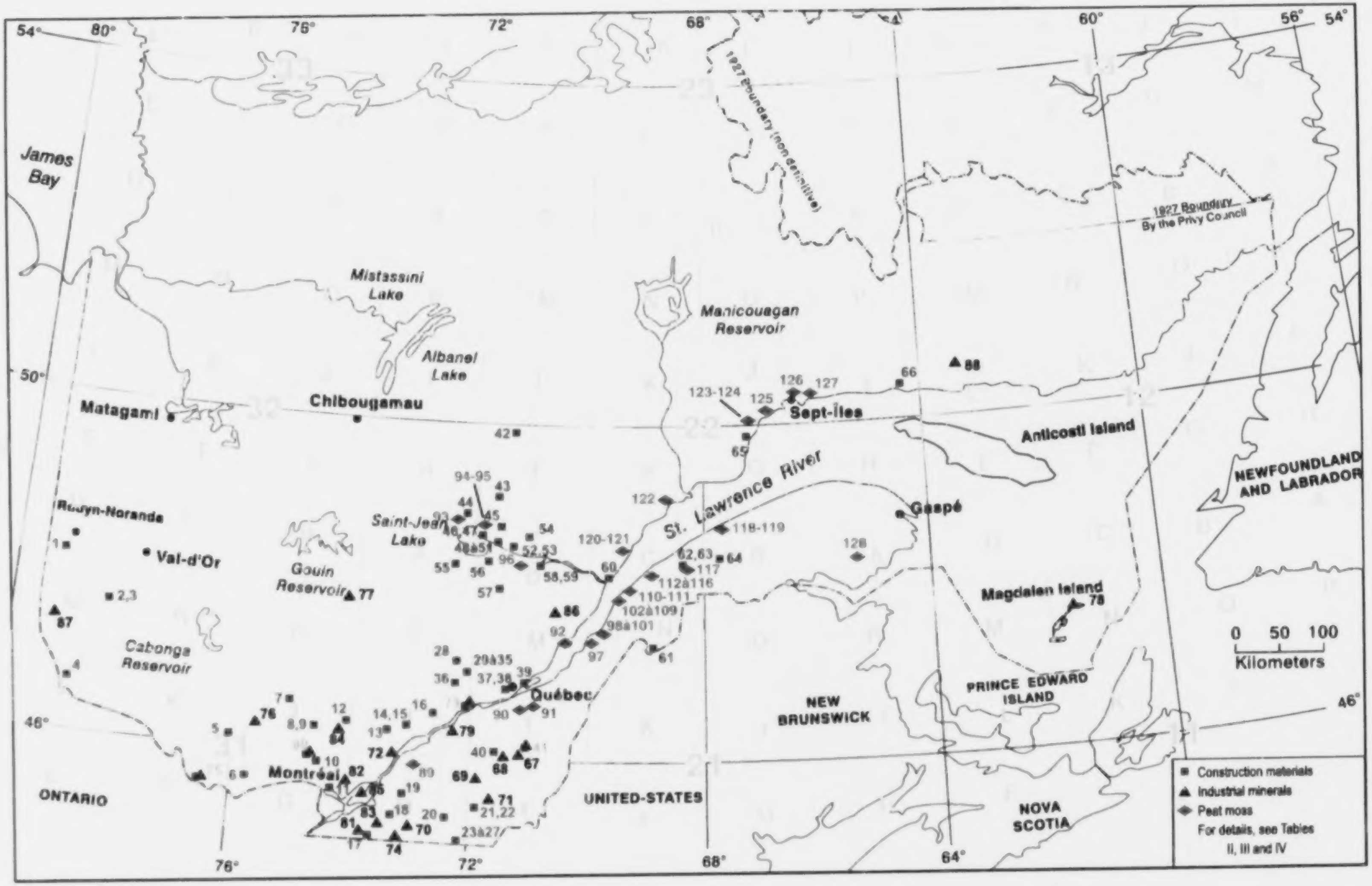

James Bay
Mistassini Lake
Albanel Lake
Matagami
Chibougamau
Rouyn-Noranda
Val-d'Or
Gouin Reservoir
Cabonga Reservoir
Saint-Jean Lake
Manicouagan Reservoir
1927 Boundary (non definitive)
1927 Boundary By the Privy Council
Sept-Îles
Anticosti Island
St. Lawrence River
Gaspé
Québec
Montréal
Magdalen Island
PRINCE EDWARD ISLAND
NEW BRUNSWICK
NOVA SCOTIA
NEWFOUNDLAND AND LABRADOR
ONTARIO
UNITED-STATES
0 50 100
Kilometers
■ Construction materials
▲ Industrial minerals
◆ Peat moss
For details, see Tables II, III and IV
54°
80°
76°
72°
68°
64°
60°
56°
50°
46°

Figure II. Mining activities in Québec in 2002. Construction materials, industrial minerals and peat moss.

TABLE II – Architectural stone quarries exploited in Québec in 2002 (see figure II).

SITE	LOCATION	COMPANY	ROCK TYPE PRODUCTS*	COMMERCIAL NAME	TOWNSHIP / NTS / ADMINISTRATIVE REGION	TITLE
1	Beaudry	Les Pierres du Nord	Schiste à biotite du Groupe de Pontiac / 3	–	Montbeillard / 32D03 / 08	BEX 086
2	Winneway	Groupe Polycor	Granite gris rosé, à grain fin / 1	Winneway	Hallé, Guy / 31M09 / 08	BEX 167
3	Winneway	Groupe Polycor	Granite gris rosé, à grain fin / 1	Golden	Hallé, Guy / 31M09 / 08	BEX 323
4	Témiscaming	Les Pierres du Nord	Quartzite à muscovite, verte / 3, 6	–	Campeau / 31L10 / 08	BEX 355
5	Blue Sea	Carrière Tremblay et Fils	Marbre dolomitique à diopside / 6	–	Wright / 31K01 / 07	Aucun
6	Wilson's Corner	Sablières de la Gatineau	Pegmatite granitique variant de rose orangé à gris blanchâtre / 6	–	Wakefield / 31G12 / 07	Aucun
7	Guénette	Rock of Ages du Canada	Monzogranite rose rougeâtre, à grain variant de fin à moyen / 1, 2	Rose Laurentien, Rose Automne	Campbell / 31J11/ 15	CM 079
8	Labelle	Robert Durand	Paragneiss quartzofeldspathique / 3	–	Joly / 31J07 / 15	BEX 076
9	Labelle	Les Pierres Mitchell	Paragneiss quartzofeldspathique / 3	–	Joly / 31J07 / 15	BEX 330
10	Rockway Valley	Sablières de la Gatineau	Marbre dolomitique / 6	–	Ponsonby / 31G15 / 07	Aucun
11	Saint-Canut	Les Pierres Saint-Canut	Grès beige crème de la Formation de Cairnside / 3	Grès de Saint-Canut	Seigneurie Lac-des-Deux-Montagnes 3 / 31G09 / 15	Aucun
12	Saint-Donat-de-Montcalm	Carrières F. L.	Gneiss granitique, rose brunâtre, à grain fin / 3	–	Lussier / 31J08 / 14	BEX 140
13	Saint-Didace	A. Lacroix et Fils Granit	Mangérite quartzifère, porphyroïde, à grain grossier, brun rougeâtre / 1	Rouge Nordix	Hunter (Lanaudière) / 31I06 / 14	Aucun
14	Saint-Alexis-des-Monts	Groupe Polycor	Mangérite quartzifère, brune, à grain grossier / 1, 2	Newton	Hunterstown / 31I06 / 04	Aucun
15	Saint-Alexis-des-Monts	Firstake Capital	Mangérite quartzifère, brune, à grain grossier / 3, 4	Brun Diamant	Hunterstown / 31I06 / 04	BEX 174
16	Shawinigan	Les Entreprises Élie Grenier	Gneiss oeillé / 3	–	Shawinigan / 31I10 / 04	Aucun

TABLE II – Architectural stone quarries exploited in Québec in 2002 (see figure II).

SITE	LOCATION	COMPANY	ROCK TYPE PRODUCTS*	COMMERCIAL NAME	TOWNSHIP / NTS / ADMINISTRATIVE REGION	TITLE
17	Havelock	Les Carrières Ducharme	Grès gris et beige de la Formation de Cairnside / 3	Grès d'Hemmingford	Havelock / 31H04 / 16	Aucun
18	Saint-Jean-sur-Richelieu	P. Baillargeon	Calcaire gris foncé de la Formation de Montréal / 3	–	Seigneurie Longueuil / 31H06 / 16	Aucun
19	Saint-Hilaire	Carrière Richard Poudrette	Cornéenne en contact avec les roches Montérégiennes du Mont-Saint-Hilaire / 6	–	Seigneurie Rouville / 31H11 / 16	Aucun
20	Stukely-Sud	Agrégats Waterloo	Marbre calcitique et marbre dolomitique / 6	–	Stukely / 31H08 / 05	Aucun
21	Bromptonville	Carrière Ardoise 55	Ardoise noir grisâtre de la Formation de Saint-Victor / 3	–	Brompton / 21E05 / 05	Aucun
22	Bromptonville	Carrière Ardobec	Ardoise noir grisâtre de la Formation de Saint-Victor / 3	–	Brompton / 21E05 / 05	Aucun
23	Stanstead	Granit Export	Granite gris, à grain moyen / 1	–	Stanstead / 31H01 / 05	Aucun
24	Stanstead	Groupe Polycor	Granite gris, à grain moyen / 1, 2	Gris de Stanstead	Stanstead / 31H01 / 05	Aucun
25	Stanstead	Granit Marlington	Granite gris, à grain moyen / 3	–	Stanstead / 31H01 / 05	Aucun
26	Stanstead	Rock of Ages du Canada	Granite gris, à grain moyen / 1, 2	Gris de Stanstead	Stanstead / 31H01 / 05	Aucun
27	Stanstead	Centre du Granite Beebe	Granite gris, à grain moyen / 1, 3	–	Stanstead / 31H01 / 05	Aucun
28	Rivière-à-Pierre	A. Lacroix et Fils Granit	Mangérite quartzifère, porphyroïde, à grain grossier, gris noirâtre / 1	Bleu Atlantique	Bois / 31P01 / 03	BEX 178
29	Rivière-à-Pierre	Granicor	Mangérite quartzifère et farsundite, porphyroïde, variant de gris brunâtre à gris orangé, à grain grossier / 1, 4	Nara Brown	Bois / 31P01 / 03	BEX 231
30	Rivière-à-Pierre	Groupe Polycor	Farsundite porphyroïde, gris brunâtre, à grain grossier / 1, 4	Calédonia	Bois / 31P01 / 03	BEX 033
31	Rivière-à-Pierre	Groupe Polycor	Farsundite porphyroïde, gris brunâtre, à grain grossier / 1, 4	Calédonia	Bois / 31P01 / 03	Aucun
32	Rivière-à-Pierre	Granite D. R. C., Stone Vogue International	Farsundite porphyroïde, gris brunâtre, à grain grossier / 1, 3, 4	Calédonia Canadien	Bois / 31P01 / 03	Aucun

TABLE II – Architectural stone quarries exploited in Québec in 2002 (see figure II).

SITE	LOCATION	COMPANY	ROCK TYPE PRODUCTS*	COMMERCIAL NAME	TOWNSHIP / NTS / ADMINISTRATIVE REGION	TITLE
33	Rivière-à-Pierre	A. Lacroix et Fils Granit	Farsundite porphyroïde, variant de gris brunâtre à gris verdâtre, à grain grossier / 1	Deer Brown, Vert Atlantique, Deer Brown D.D.	Bois / 31P01 / 03	BM 723, BM 746
34	Rivière-à-Pierre	Granicor	Mangérite et jotunite quartzifère, porphyroïde, variant de gris à noir verdâtre, à grain grossier / 1	Vert Prairie, Dark Steel	Bois / 31P01 / 03	BEX 165
35	Rivière-à-Pierre	A. Lacroix et Fils Granit	Mangérite quartzifère, porphyroïde, gris verdâtre, à grain grossier / 1	–	Bois / 31P01 / 03	BEX 349
36	Rivière-à-Pierre	Groupe Polycor	Mangérite quartzifère, porphyroïde, gris verdâtre / 1	Vert Boréal	Chavigny / 31I16 / 03	BEX 333
37	Sainte-Foy	Agrégats Ste-Foy	Gneiss gris, migmatisé, à grain moyen / 3	–	Seigneurie Gaudarville / 21L14 / 03	Aucun
38	Québec	Carrière Union	Calcaire gris brunâtre du Groupe de Trenton / 3	–	Seigneurie Gaudarville / 21L14 / 03	Aucun
39	Château-Richer	Carrière Laplante	Calcaire gris brunâtre du Groupe de Trenton / 3	–	Seigneurie Côte-de-Beaupré / 21L14 / 03	Aucun
40	Saint-Ferdinand	A. Langlois et Fils	Grès gris et dolomie grise du Groupe d'Oak Hill / 3, 6	–	Halifax / 21L04 / 17	Aucun
41	East Broughton	Les Pierres Stéatites	Stéatite et roche à talc-carbonate du Complexe ophiolitique de Thetford-Mines / 7	–	Broughton / 21L03 / 12	Aucun
42	Chute-des-Passes	A. Lacroix et Fils Granit	Gneiss migmatisé, rose grisâtre, à grain moyen / 1	New Rainbow	Lidice / 22E14 / 02	BEX 377
43	Chute-des-Passes	Groupe Polycor	Farsundite porphyroïde, rose grisâtre, à grain grossier / 1	Astra	Petit / 22E04 / 02	BEX 001
44	Mistassini	Les Calcites du Nord	Marbre calcitique / 6	–	Pelletier / 32A16 / 02	Aucun
45	Chute-du-Diable	Granicor	Anorthosite noire, à grain grossier / 1, 2	Noir Péribonka	Garnier / 22D13 / 02	Aucun
46	Saint-Henri-de-Taillon	Groupe Polycor	Anorthosite noire, à grain grossier / 1, 2	Noir Taillon	Taillon / 22D12 / 02	Aucun
47	Saint-Henri-de-Taillon	Granite Aurélien Tremblay	Anorthosite noire, à grain grossier / 1, 2	Northern Black	Taillon / 22D12 / 02	Aucun

TABLE II – Architectural stone quarries exploited in Québec in 2002 (see figure II).

SITE	LOCATION	COMPANY	ROCK TYPE PRODUCTS*	COMMERCIAL NAME	TOWNSHIP / NTS / ADMINISTRATIVE REGION	TITLE
48	Saint-Nazaire	A. Lacroix et Fils Granit	Leucogabbronorite à olivine, variant de noir grisâtre à noir verdâtre, à grain grossier / 1	Noir Atlantique, Vert Nordix	Taché / 22D12 / 02	BEX 148
49	Saint-Nazaire	A. Lacroix et Fils Granit	Leucogabbronorite à olivine, variant de noir grisâtre à noir verdâtre, à grain grossier / 1, 2	Vert Nordix, Noir Atlantique	Taché / 22D12 / 02	Aucun
50	Saint-Nazaire	Granicor	Leucogabbronorite à biotite, noire, à grain variant de moyen à grossier / 1, 2	Noir Cambrien	Taché / 22D12 / 02	BEX 332
51	Saint-Nazaire	Groupe Polycor	Leucogabbronorite à biotite, noire, à grain variant de moyen à grossier / 1, 2	Noir Cambrien	Taché / 22D12 / 02	BM 705 (2 carrières)
52	Bégin	A. Lacroix et Fils Granit	Mangérite quartzifère, porphyroïde, rose grisâtre, à grain grossier / 1	Rose Atlantique	Bégin / 22D11 / 02	Aucun
53	Bégin	Granite Aurélien Tremblay	Mangérite quartzifère, porphyroïde, rose grisâtre, à grain grossier / 1	Rose Sauvage	Bégin / 22D11 / 02	Aucun
54	Saint-Honoré	Les Pierres Naturelles Tremblay	Calcilutite gris noirâtre de la Formation de Simard / 3	–	Falardeau / 22D11 / 02	Aucun
55	Saint-François-de-Sales	Granite Aurélien Tremblay	Mangérite porphyroïde, noir verdâtre, à grain grossier / 1	Vert Printemps, Bleu-vert Jeannois	Dechêne / 32A08 / 02	BEX 203
56	Métabetchouan	Groupe Polycor	Farsundite porphyroïde, rose orangé, à grain grossier / 1	Betchouan Violetta, Betchouan	Caron / 22D05 / 02	Aucun
57	Mont-Apica	Groupe Polycor	Jotunite quartzifère, verte, à grain grossier / 1, 2	Vert Laurentide	Lac Saint-Jean-2 / 22D04 / 03	BEX 210
58	La Baie	Granicor	Farsundite porphyroïde, brun orangé,à grain grossier / 1	Polychrome	Bagot / 22D07 / 02	Aucun
59	La Baie	Groupe Polycor	Farsundite porphyroïde, brun orangé, à grain grossier / 1	Polychrome	Bagot / 22D07 / 02	Aucun
60	Grandes-Bergeronnes	Granicor	Orthogneiss rose, à grain moyen / 1	Tadoussac	Bergeronnes / 22C04 / 09	Aucun

TABLE II – Architectural stone quarries exploited in Quebec in 2002 (see figure II).

SITE	LOCATION	COMPANY	ROCK TYPE PRODUCTS*	COMMERCIAL NAME	TOWNSHIP / NTS / ADMINISTRATIVE REGION	TITLE
61	Saint-Marc-du-Lac-Long	Carrière Glendyne	Ardoise noire de la Formation de Témiscouata / 3, 5	La Canadienne, Glendyne Slate, North Country Black	Bostford / 21N07 / 01	Aucun
62	Mont-Lebel	Antoine Jean	Siltstone gris verdâtre, à grain fin de la Formation de Saint-Léon / 3	–	Macpès / 22C08 / 01	Aucun
63	Mont-Lebel	Les Pierres Naturelles du Québec	Siltstone gris verdâtre, à grain fin de la Formation de Saint-Léon / 3	–	Macpès / 22C08 / 01	Aucun
64	Saint-Cléophas	Carrière Bernier	Siltstone gris bleuté, à grain fin de la Formation de Saint-Léon / 3	–	Awantjish / 22B05 / 01	Aucun
65	Rivière-Pentecôte	Groupe Polycor	Anorthosite gris noirâtre, à grain grossier / 1	Noir Nordic	– / 22G14 / 09	BEX 155
66	Magpie	Groupe Polycor	Syénite à hypersthène, variant de brune à rose brunâtre, à grain moyen / 1	Magpie	Fornel / 22I08 / 09	BEX 091
73**	Saint-Marc-des-Carrières	Graymont (QC)	Calcaire gris de la Formation de Deschambault / 1	Calcaire Saint-Marc	Seigneurie La Chevrotière / 31I09 / 03	Aucun
75**	Portage-du-Fort	Dolomex	Marbre dolomitique, blanc / 6	–	Litchfield / 31F10 / 07	Aucun
80**	Saint-Rémi-d'Amherst	Société minière Gerdin	Quartzite / 6	–	Amherst / 31G15 / 15	BEX 107

* 1 - Dimension stone ; 2- Tombstone ; 3- Building stone, paving stone ; 4- Curbstones ; 5- Roofing tiles ; 6- Decorative aggregates ; 7- Blocks for sculpture, - refractory plates.

** Quarries exploited mainly for industrial stone and, secondly, for construction materials.

TABLE III - Industrial mineral quarries in production in Québec in 2002 (see figure II).

SITE	QUARRY	COMPANY	DESCRIPTION OF DEPOSIT	PRODUCTS	ADMINISTRATIVE REGION
Amiante (chrysotile)					
67	Bell	LAB Chrysotile	Réseau de veines (stockwerk) dans des ultramafites serpentinisées	Fibres	Thetford / 21L03/ 12
68	Black Lake	LAB Chrysotile	Réseau de veines (stockwerk) dans des ultramafites serpentinisées	Fibres	Ireland / 21L03 / 12
69	Jeffrey	JM Asbestos	Réseau de veines (stockwerk) dans des ultramafites serpentinisées	Fibres	Shipton / 21E13 / 12
Calcaire de haute pureté					
70	Bedford	Graybec Calc	Calcaire de la Formation de Corey	Chaux vive, produits de calcaire broyé pour usage industriel, pierre concassée	Stanbridge / 31H03 / 16
71	Domlin	Graybec Calc	Calcaire du Groupe du Lac Aylmer	Chaux vive, produits de calcaire broyé pour usage industriel, pierre concassée	Dudswell / 21E12 / 12
72	Jolichaux	Graybec Calc	Calcaire de la Formation de Deschambault	Chaux vive, produits de calcaire broyé pour usage industriel, pierre concassée	Lavaltrie / 31I03 / 14
73	Calco	Graymont Portneuf	Calcaire de la Formation de Deschambault	Pierre concassée, produits de calcaire broyé pour usage industriel	Seigneurie de Grondines / 31I09 / 03
74	Saint-Armand Ouest	Compléments industriels	Marbre de Strites Pond	Calcaire pulvérisé pour charges minérales	Seigneurie de Saint-Armand / 31H03 / 16
Dolomie et marbre dolomitique de haute pureté					
75	Portage-du-Fort	Dolomex	Marbre dolomitique Précambrien	Chaux agricole, poudres fines pour usage industriel, granules décoratifs	Litchfield / 31F10 / 07
Graphite					
76	Lac-des-Îles	Timcal Canada	Graphite en paillettes disséminées dans des calcaires cristallins (± quartzite)	Paillettes pour réfractaires, acier, moules de fonderie, lubrifiant, garniture de freins	Bouthillier / 31J05 / 15
Mica					
77	Letondal	Les Produits Mica Suzorite	Intrusion alcaline lenticulaire contenant 80-85 % phlogopite (variété suzorite)	Mica broyé pour charges minérales (ciment à joint, plastique) et boues de forage	Suzor / 31O16 / 04

TABLE III - Industrial mineral quarries in production in Québec in 2002 (see figure II).

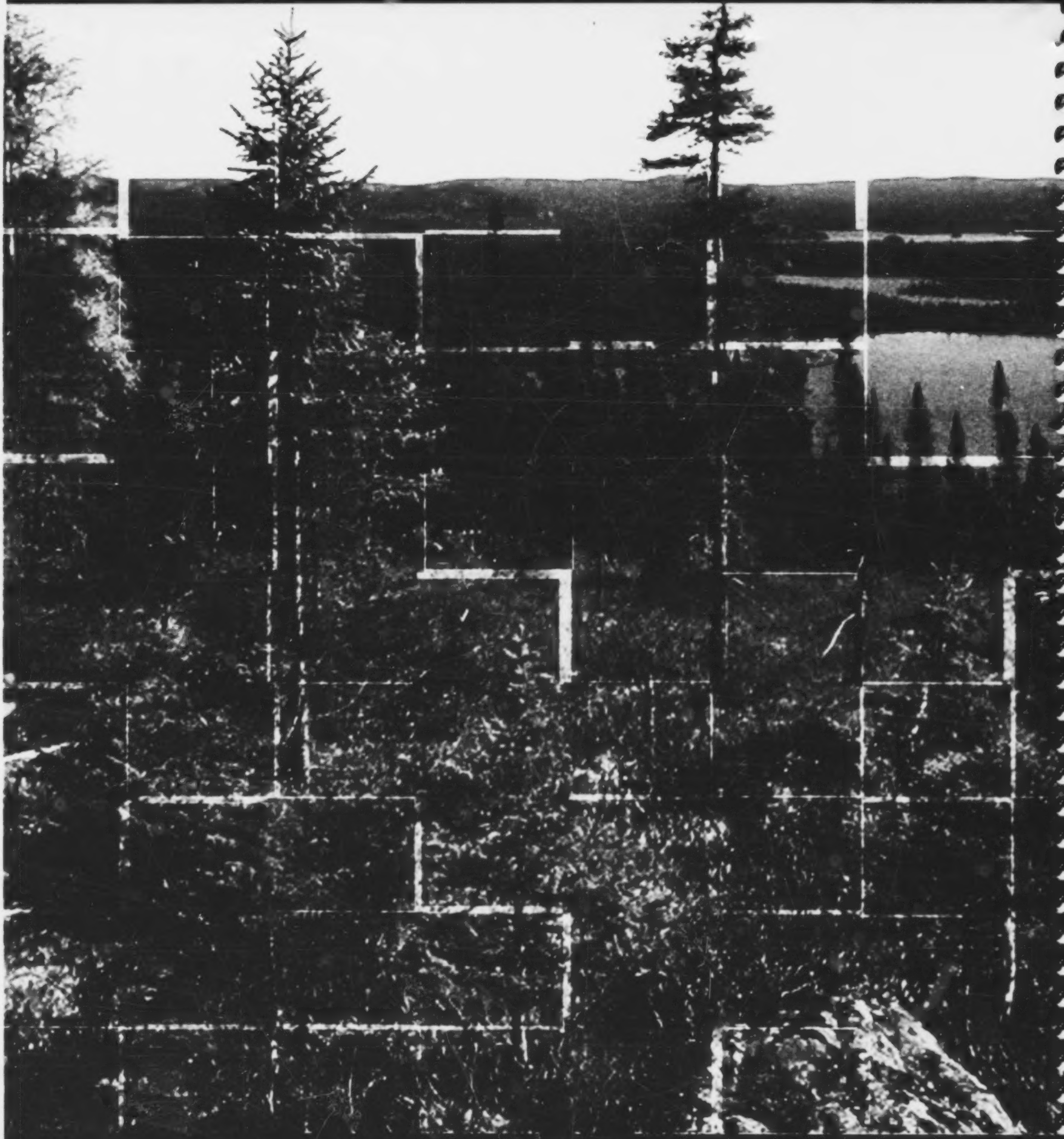
SITE	QUARRY	COMPANY	DESCRIPTION OF DEPOSIT	PRODUCTS	ADMINISTRATIVE REGION
Sel					
78	Seleine	La Société canadienne de sel (division Mine Seleine)	Dôme de sel	Sel déglaçant	Îles-de-la-Madeleine / 11N12 / 11
79	Bécancour	Junex	Saumures	Produits déglaçants et abat-poussière	Bécancour / 31G/08 /17
Silice					
80	Saint-Rémi d'Amherst	Société minière Gerdin	Quartzite	Sable de silice pour cimenterie	Amherst / 31G/15 /15
81	Ormstown	La Cie Bon Sable (division Ormstown)	Sable naturel	Sable lavé pour sablage au jet, fonderie, mélange pour colle à céramique	Beauharnois-2 / 31H04 / 16
82	Saint-Canut	Unimin Canada (division Saint-Canut)	Grès de Postdam	Sable pour verre, sablage au jet, filtre, céramique	Lac-des-Deux-Montagnes- 3 / 31G09 / 15
83	Sainte-Clotilde	Les Sables Silco	Grès de Postdam	Pierre concassée riche en silice pour cimenterie et ferro-silicium	Beauharnois-1 / 31H04 / 16
84	Saint-Donat	Unimin Canada (division Saint-Donat)	Quartzite	Sable pour le carbure de silicium	Lussier / 31J08 / 14
85	Saint-Joseph-du-Lac	La Cie Bon Sable	Sable naturel	Sable lavé pour la maçonnerie et le sablage au jet	Lac-des-Deux-Montagnes-1 / 31H12 / 15
86	Petit lac Mabaie	Sitec inc.	Quartzite	Quartz en morceaux pour le silicium métal et sable de silice pour le carbure de silicium	Charlevoix / 21M15 / 03
87	Saint-Bruno-de-Guigues	Temisca Silice	Grès d'âge ordovicien	Sables pour filtration, fonderie, fracturation hydraulique	Guigues / 31M05 / 08
Talc et stéatite					
41	Fraser	Les Pierres Stéatite inc.	Stéatite	Blocs pour sculpture, plaques réfractaires	Broughton / 21L03 / 12
Titane					
88	Lac Tio	QIT - Fer et Titane	Hémo-ilménite massive dans l'anorthosite du Complexe d'Havre-Saint-Pierre	Scories de titane (Sorel slag) pour la production de pigments et de fer de refonte, ilménite concassée (Sorel flux)	Parker / 12L09 et 12L11 / 09

TABLE IV - Peat bogs in exploitation in Québec in 2002 (see figure II).

SITE	PEAT BOG (DEPOSIT)	COMPANY	PRODUCTS	TOWNSHIP/NTS ADMINISTRATIVE REGION
89	Saint-Bonaventure	Fafard et Frères (division Saint-Bonaventure)	Tourbe de sphaignes, terreaux, composts, biofiltres	Upton / 31H15 / 04
90	Saint-Henri-de-Lévis	Premier Horticulture (division Saint-Henri)	Tourbe de sphaignes	Seigneurie Lauzon / 21L11 / 12
91	Saint-Charles	Les tourbes M. L. (division Saint-Charles)	Tourbe de sphaignes Terreaux	Seigneurie Lauzon et fief de La Martinière (Beauchamp) / 21L10 / 12
92	Îsle-aux-Coudres	Tourbière Pearl	Tourbe de sphaignes	Seigneurie Îsle-aux-Coudres / 21M08 / 03
93	Sainte-Marguerite	Fafard et Frères (division Sainte-Marguerite)	Tourbe de sol	Racine / 32A16 / 02
94	L'Ascension Ouest	Tourbières Lambert (division L'Ascension)	Tourbe de sphaignes	Garnier / 22D13 / 02
95	Saint-Ludger-de-Milot SW	Fafard et Frères (division Sainte-Marguerite)	Tourbe de sphaignes	Milot / 22D13 / 02
96	La Baie	Tourbières Lambert (division L'Ascension)	Blocs de tourbe de sphaignes	Bagot / 22D07 / 02
97	Rivière-Ouelle (division Rivière-Ouelle)	Tourbières Lambert	Tourbe de sphaignes, terreaux, mousse florale	Seigneurie Rivière-Ouelle 21N05 / 01
98	Saint-Alexandre	Tourbière Saint-André	Tourbe de sphaignes	Seigneuries Islets-du-Portage et Lachenaie / 21N12 / 01
99	Saint-Alexandre	Tourbière Saint-Alexandre	Tourbe de sphaignes	Seigneuries Islets-du-Portage et Lachenaie / 21N12 / 02
100	Saint-Alexandre	Tourbière Mouska	Tourbe de sphaignes	Seigneuries Islets-du-Portage et Lachenaie / 21N12 / 03
101	Notre-Dame-du-Portage	Premier Horticulture (division Tardif)	Tourbe de sphaignes	Seigneurie Terrebois / 21N12 / 01
102	Rivière-du-Loup	Premier Horticulture (division Premier)	Tourbe de sphaignes, terreaux, composts, endomycorrhyzes, biofiltres	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
103	Rivière-du-Loup	Premier Horticulture (division Verbois)	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
104	Rivière-du-Loup	Premier Horticulture (division Saint-Laurent)	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
105	Rivière-du-Loup	Tourbière Michaud ltée	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01

TABLE IV - Peat bogs in exploitation in Québec in 2002 (see figure II).

SITE	PEAT BOG (DEPOSIT)	COMPANY	PRODUCTS	TOWNSHIP/NTS ADMINISTRATIVE REGION
106	Rivière-du-Loup	Les tourbes M. L. (division Rivière-du-Loup)	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
107	Rivière-du-Loup	Tourbière Berger inc.	Tourbe de sphaignes, terreaux	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
108	Rivière-du-Loup	Tourbière Henri Théberge et associés	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
109	Rivière-du-Loup	Tourbière Omer Bélanger	Tourbe de sphaignes	Seigneuries Rivière-du-Loup et Cacouna / 21N13-14 / 01
110	Isle-Verte, EST	Tourbière Réal Michaud et fils	Tourbe de sphaignes	Seigneurie Isle-Verte / 22C03 / 01
111	Isle-Verte, SW	Tourbière Ouellet et fils	Tourbe de sphaignes	Seigneurie de Villeray / 21N14 / 01
112	Saint-Eugène-de-Ladrière	La tourbière Yvon Bélanger	Tourbe de sphaignes	Seigneurie Nicolas-Rioux 03 / 22C07 / 01
113	Saint-Fabien-sur-Mer	La tourbière Rio-Val	Tourbe de sphaignes	Seigneurie Nicolas-Rioux 03 / 22C07 / 01
114	Saint-Fabien-sur-Mer	Tourbière de la Mer	Tourbe de sphaignes	Seigneurie Nicolas-Rioux 03 / 22C07 / 01
115	Saint-Fabien	Tourbière du Port-Pic	Tourbe de sphaignes	Seigneurie Nicolas-Rioux 03 / 22C07 / 01
116	Saint-Fabien	Tourbière Berger inc. (division Saint-Fabien)	Tourbe de sphaignes	Seigneurie Nicolas-Rioux 03 / 22C07 / 01
117	Lac Malobès	Exportations Daniel Sage inc	Blocs de tourbe de sphaignes	Seigneurie Nicolas-Rioux / 22C07 / 01
118	Rivière-Blanche	Premier Horticulture (division Saint-Ulric)	Tourbe de sphaignes	Matane / 22B13 / 01
119	Saint-Ulric	Les tourbes M. L. (division Saint-Ulric)	Tourbe de sphaignes	Matane / 22B13 / 01
120	Les Escoumins	Tourbières Lambert (division Anse-aux-Basques)	Tourbe de sphaignes	Bergeronnes / 22C06 / 09
121	La Petite Romaine	Tourbières Lambert (division Saint-Paul-du-Nord)	Tourbe de sphaignes	Iberville / 22C06 / 09
122	Pointe-Lebel	Premier Horticulture (division Sogevex)	Tourbe de sphaignes	Manicouagan / 22F01 / 09
123	Port-Cartier Ouest	9006-1474 Québec inc. (Les Tourbières Torland)	Tourbe de sphaignes Blocs de tourbe de sphaignes	Babel / 22J02 / 09
124	Port-Cartier Ouest	Exportations Daniel Sage inc.	Blocs de tourbe de sphaignes	Babel / 22J02 / 09
125	Port-Cartier Est	Tourbières Blocs Dorés	Blocs de tourbe de sphaignes	Leneuf / 22J02 / 09
126	Ville de Sept-Îles (division tourbières Sept-Îles)	Les tourbes M. L.	Blocs de tourbe de sphaignes	Letellier / 22I05 / 09
127	Rivière-Moisie	Premier Horticulture (division Sept-Îles)	Tourbe de sphaignes	Moisie / 22I05/ 09
128	Saint-Jogues	Shigawake Organics Ltd	Tourbe de sphaignes	Hope / 22A03 / 11



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